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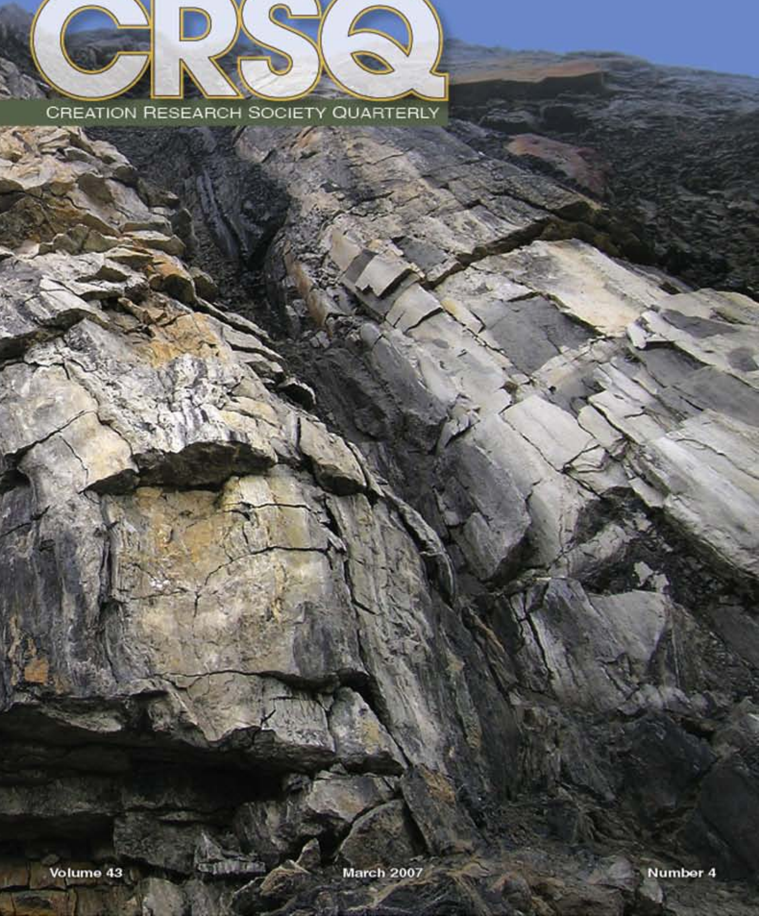

Volume 43 March 2007 Number 4

Creation Research Society Quarterly

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Cover design by Michael Erkel:
Michael Erkel and Associates, 1171 Carter Street,
Crozet, Virginia 22932

The *Creation Research Society Quarterly* is published by the Creation Research Society, 6801 N. Highway 89, Chino Valley, AZ 86323, and it is indexed in the *Christian Periodical Index* and the *Zoological Record.*

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Send book reviews to the Book Review Editor: Don B. DeYoung, 200 Seminary Dr., Winona Lake, IN 46590.

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ISSN 0092-9166

Printed in the United States of America

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Haec Credimus

For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested on the seventh.—Exodus 20:11

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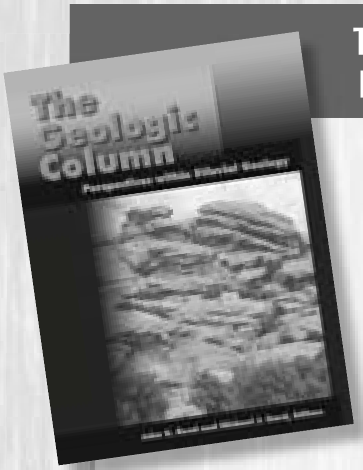
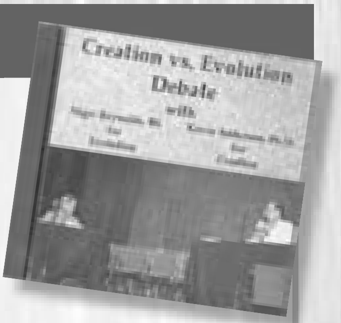


The Geologic Column: Perspectives within Diluvial Geology

John K. Reed and Michael J. Oard, Editors 2006. Creation Research Society, 157 pages. Regular price: $15.00; Member price: $11.00.

Many wonder how the evolutionary/uniformitarian geologic column fits into diluvial geology. At present, there is a remarkable diversity of original thought on this subject. Recent exchanges in the creationist literature show a tendency for various participants to talk past one another. This book has brought these different perspectives together with two goals: 1) to better define the real differences within diluvial geology, and 2) to identify the concrete issues that will provide a basis for continued research and, hopefully, future resolution. The editors went one step further by providing, at the end of most chapters, a forum with comments and responses. In addition to the editors, the other authors are: Terry Mortenson, Peter Klevberg, Carl Froede Jr., David J. Tyler, Harold G. Coffin, and Emil Silvestru. Though it may be difficult to visualize now, diluvial geology represents a major paradigm shift that holds the potential to stimulate a revolution within the earth sciences.

Creation vs. Evolution Debate



2006. Creation Research Society, approx. 45 minutes. Audio CD. Regular price: $10.00; Member price: $8.00.

Dr. Kevin Anderson (director of the Society's Van Andel Creation Research Center) squares off against local Arizona anti-creationist, Nigel Reynolds. The debate features initial arguments by both presenters followed by lively rebuttals, cross-examinations, and audience questions. This debate provides the listener an excellent opportunity to weigh the arguments of each side and seriously consider where the scientific evidence best fits.

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Editorial

Science vs. Evolutionism

Evolutionists often attempt to present the evolution/creation debate in terms of “science vs. religion” or “science vs. creationism” (see note 1). In so doing, they seek to define evolution as “science,” and portray the debate as the objective and rational process of science being attacked by the irrational and biased claims of certain religious fundamentalists. Defining the debate in this manner also gives them justification for excluding pro-creation material from science journals and classrooms. It further seeks to cast a very negative light on creation science among many Christians, who then perceive there must be a conflict between their biblical understanding and science. Certainly, creating this false dilemma among many well-meaning Christians is one of the most successful deceptions of the evolution camp.

One very loud voice promoting this false dilemma has been Oxford Professor Dr. Richard Dawkins. Dawkins, always an outspoken critic of Christianity in general and of creation in particular, has become even more angry and hostile in recent years. His recent book, *The God Delusion*, rants that virtually every evil in the world can be linked to religious influence. Really? Dr. Dawkins apparently so quickly forgets the tens of millions killed just in the twentieth century at the hands of people like Adolf Hitler and Joseph Stalin (hardly religious people), or that more Christians were martyred in the twentieth century than the previous nineteen centuries combined. Alas, facts were never Dawkins’s strong point.

But I digress. The sharpest focus of Dawkins’s anger appears to be those of us who maintain the unthinkable idea that God really did create as he describes in Genesis and that scientific investigation actually supports this premise. Perhaps, as Dawkins gets older, the little voice that says, “Prepare to meet thy creator” is getting louder? Shrill ranting may help him drown that voice out.

However, it is not just Dawkins. Others joined his animosity last November at a conference at the Salk Institute for Biological Studies (La Jolla, CA). I have no idea of the original intent of this conference, but what it became was a religion-bashing pep rally. I find it very interesting that this institute would never allow a meeting of creation scientists because such a meeting would be far too religious. No doubt we would be reminded that they are a “science” institute (named after the discoverer of the polio vaccine, Dr. Jonas Salk). But “scientism” and “Christian bashing” are apparently appropriate content for their meetings. Using the pretense of a scientific meeting, the participants sounded more like preachers at a tent revival. Attendees spouted comments that science should do everything it can to eliminate theism, and referred to religion as a “long nightmare.” The rhetoric clearly revealed that their so-called scientific understanding was completely influenced by their worldview.

Known as “scientism,” this particular worldview accepts no supernatural realm, only the material world. Rather than accepting that science is merely a human activity unable to answer many of life’s most basic questions (its successful track record of technological and medical success not withstanding), supporters of scientism submit that science is the ultimate and final authority on everything. Claiming to be a scientific position, it actually violates the very premise of scientific thought and inquiry. Science requires challenges from competing ideas. This is the very core of the scientific method. Scientific self-correction requires questioning cur-

> Evolutionists seek to define evolution as “science,” and portray the debate as the objective and rational process of science being attacked by the irrational and biased claims of certain religious fundamentalists.

rent opinions. Challenges and dissent are good things. They sharpen thinking, forcing the elimination of outdated or erroneous material. Scientism, on the other hand, is a jealous god that allows no competing ideas (or I should say "ideologies"). The statements of those attending the Salk Institute conference attest to this—so much for scientific inquiry and open discussion. Instead, this rhetoric harkens to a type of Orwellian scientific "dark age," where no one dare question the "official" scientific version of anything. Who determines this "official" version is less clear (many at this conference appear very willing to make this determination). What is clear is that at this point science stops being science.

Another by-product of scientism is the utter conviction of the truth of evolution (as it supports materialism) and the application of an "ends justifies the means" perspective. Since we "know" evolution and materialism are true, then anything inconsistent with them is wrong. And, according to Dawkins, any opposing view is downright "evil" (an amusing statement from someone who says there is no such thing as good or evil—apparently creationists are so bad that they are evil even in a universe where evil does not exist).

When truth is measured through the lens of scientism, it apparently is acceptable to attack the enemy with false accusations and lies. After all, it is not really a lie because scientism tells us it ought to be true. So, it becomes the same as if the accusations are actually true.

One excellent example of this recently came to light. A group calling themselves PEER (Public Employees for Environmental Responsibility) has recently made several false allegations, such as that the Bush administration will not allow rangers at Grand Canyon Park to discuss the age for the canyon, and that videos and plaques at the park have been altered to present a more pro-creation position. They have further claimed that any park service personnel who object will risk their career.

Several others began to promote PEER's claims, including cartoonist Gary Trudeau (creator of *Doonesbury*) in his January 13, 2007, strip, and Michael Shermer, of *Skeptic* magazine, an avid anti-creationist. Mr. Shermer initially accepted PEER's claims and proceeded to diligently promote them. However, after being contacted by some park officials and others, Mr. Shermer investigated PEER's claims and found them totally fabricated. Showing a level of intellectual integrity that is increasingly rare, he proceeded to immediately retract his support of PEER's claims and wrote a scathing exposé of PEER's lies.

Nonetheless, the actions of PEER illustrate very well a "fruit" of scientism. Truth is relative. (Not coincidently, most contemporary "isms" do not accept an ultimate truth.) PEER's dedication to the worship of scientism allowed them to fabricate a "truth" because they determined it served their "god." Anything promoting their "god" is acceptable, lying or cheating notwithstanding. After all, remember in the words of one of scientism's high priests, there is "no evil and no good, nothing but pitiless indifference" (Dawkins, 1995, p. 85). Such a "god" hardly cares about trivial things like truth or justice, as these do not really exist. All that exists is … well, that is a good question. According to Dawkins, the only thing that exists is injustice and indifference. And they choose to worship this god? Why?

Ultimately, the whole position of scientism is a fraud. Its supporters claim to be simply seeking clear, objective scientific understanding of the universe. In truth, they seek no such thing. They use science (falsely so called) merely as a vehicle to accomplish a very anti-science agenda: eliminate free discussion, suppress dissention, and force everything to conform to their version of reality—a fabricated reality included.

Many evolutionists would strongly object to being identified with scientism. Fair enough. But they must also concede that evolution plays a vital role in scientism. Scientism claims that science has answers for everything, including the key questions of life. Evolution is used to provide many of those answers. Without evolution, scientism is bankrupt. Dawkins' (1986) acknowledgement that evolution "made it possible to be an intellectually fulfilled atheist" (p. 6) illustrates that he understands this. This makes the celebration of "Evolution Sunday" in many churches even more of a paradox.

"Evolutionism" then becomes an extension of "scientism." It becomes the answer to life's ultimate questions. As such, it clearly moves beyond the level of scientific investigation and verification. Who can scientifically verify that the sole purpose of human life is to propagate mitochondrial DNA or that the earth itself is a living soul? Yet followers of scientism have made such claims based on evolution (or, more appropriately, evolutionism). To a certain extent, all evolutionists are partially guilty of "evolutionism" (and probably more "scientism" than they might ever want to admit). After all, the key questions of life—"Who? What? Why? How?"—certainly have a different meaning when evolutionism is offered in the answer. It is interesting that most of the very reasons evolutionists insist on referring to creation science as "creationism" apply equally well to their own "ism."

The real truth is that creation scientists neither fear nor spurn scientific discussion and dialog; we welcome it. It can be a healthy human endeavor to use as part of our exploration of God's creation. His command to "subdue" the earth (Gen. 1:28) certainly includes, and even welcomes, scientific investigation. The greatest scientists of history were theists (most were Christians), and most were creationists. They believed that God created an orderly and predictable universe, which allowed them to aspire to study and understand that universe. It should be no surprise that the pioneers of science held this opinion. Without this view, they would likely have done little scientific inquiry (as is evident by the lack of early scientific investigation in cultures that believed there was no orderly creator or thought that the study of nature was infringing on some demigod's domain). So, when evolutionists continue to attempt to create this false dilemma, it is really just their attempt to suppress an honest examination of evolution (and its strong link to scientism).

Note 1. When evolutionists use the term "creationism" they are attempting to remove all scientific parameters from the word and make it strictly a philosophical "ism." In so doing, they can justify that creation is not a scientific concept, and hence the study of a creation model is not a scientific endeavor (all the more reason creation articles should be banned from scientific journals). Unfortunately, many creationists also use the term "creationism," thereby giving legitimacy to the evolutionists' use of the term. The term "creation" or "creation model" are more appropriate, and serve to support our contention that creation has a scientific parameter, and is not simply a philosophical or religious "ism."

Dawkins, R. 1986. *The Blind Watchmaker.* W.W. Norton and Co., New York, NY.

Dawkins, R. 1995. God's utility function. *Scientific American* 273:11:80–85.

Kevin Anderson, Ph.D.
Editor
Creation Research Society Quarterly

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Book Review

Crucial Questions about Creation

by John K. Reed

Mabbul Publishing/Word Ministries, Evans, GA, 2005, 129 pages, $10.00.

This book is a must-read for those interested in the burning questions about Creation. Written primarily for Christians, it gives the reader insights into current controversies surrounding origins and provides answers for pertinent questions. Dr. Reed begins by mentioning four basic questions involved in the matter of origins. He assumes that Christians would strongly affirm the primary question, "Did God create?" However, two questions that cause ongoing debate in the Christian camp relate to "when" and "how" God created. Once a person considers these, a fourth question naturally arises, "Why did God create?" Although this question is often overlooked or incorrectly answered in disputes about origins, Dr. Reed believes it to be the key element in setting a clear context for correctly evaluating and answering the "when" and "how" questions. He provides clear and persuasive evidences from the Bible, history, and science to substantiate his thesis. Although scientific information is mentioned in the book, his arguments are theological rather than scientific. The book is written in a way that captivates and holds one's interest, whether the reader is a theologian, a member of the laity, or a seasoned scientist.

The author discusses the modern "denial of God's honor and fame, manifested by the dismissal of His work of Creation and of His universal judgment in the Flood" (p. 11). From that philosophy comes the pagan view that we originate from and belong to nature, with no fear of judgment by a nonexistent deity. He points out that the Bible is the traditional authority in matters of Creation and judgment, and its reliability is dependent on the truths written about these issues.

John Reed writes that the "vast majority of attacks on the reliability of Scripture focus on Genesis" (p. 12).

Unfortunately, these attacks can even be found coming from the Christian arena. He demonstrates that the erosion of this scriptural foundation causes "creation confusion" and is "an affront to the honor of God." This compromise does not put Christians' glory and reputations in peril; but much more importantly, God's glory and reputation are placed at risk by this dangerous perversion of the truth. Reed challenges Christians to realize that nothing is "more important in the entire universe than God's glory" and that they should "not fail to see that issues of Creation impinge on God's eternal glory."

In chapter 1, the author gives a brief review of history leading up to the modern rejection of the truths of Creation. The sixteenth-century Reformation caused a rebirth of confidence in the Bible and subsequent textural studies leading to "standard exegetical and hermeneutical strategies." Because of this, people considered biblical history as real history and that Genesis stood as factual, literal, and accurate. However, the widespread revival of biblical authority birthed by the Reformation "did not survive the eighteenth-century anti-Christian revolution, inappropriately named the Enlightenment" (p.16). Christian doctrine was pushed aside by many in favor of the doctrines of such people as Voltaire, Rousseau, Comte, Hume, Kant, and Hegel. "By the early 1800s, a new worldview of naturalism had emerged from its larval camouflage of deism and started a cultural conquest that haunts us today. Understanding the importance of history, acolytes of naturalism attacked the Christian understanding of history at the points where God's greatest manifestations of power in men are demonstrated: Creation, the Flood, and the Incarnation." From here, Genesis fell under vicious attacks by naturalism, culminating in such perversions of Earth science to include a non-catastrophic and rapid formation of the rock record, millions of years needed for rock formation, no worldwide Flood, and hence, no historical veracity of Genesis. The proposal of "deep time" became established as one of the most significant events in the history of science. This helped precipitate the works of Sir Charles Lyell, who became a leader of the nineteenth-century scientific establishment and a friend and mentor to Charles Darwin. From there, it was an accelerated slide on the slippery slope of science for Darwinian evolution and uniformitarian geology to become the dogma of scientific education.

From this foundation laid by Dr. Reed, he gives a primary reason for this book: "It is sometimes easier to simplify by making sure the questions are right than by chasing answers to the wrong questions. Wisdom requires that we properly frame questions before attempting answers. So I want to look at the questions first, and then attempt some answers. Concurrent with this concern is my conviction that the terms of the current debate are not fully consistent with historical Christian theology, and the two must be aligned" (p. 20). He recommends that the offensive weapon to be used in this debate is God's Word, the "sword of the Spirit." He then amplifies on five principles referenced from the seventeenth-century Westminster Confession of Faith: 1) the authority of Scripture, 2) the sufficiency of Scripture, 3) the perspicuity of Scripture, 4) the Scripture is interpreted by itself, and 5) the Bible alone is the final word in religious disputes.

With this background in mind, Reed considers "The Foundational Question about Creation" in chapter 2. Here, he clearly and eloquently provides the answer to the "why" of Creation. Considering this keystone question, he draws insights from the Bible, his experience, and the writing of Jonathan Edwards, an eighteenth-century theologian and Christian thinker. In his work titled *A Dissertation concerning the End for Which God Created the World*, Edwards clearly addresses the "why" of Creation. Many references from this work are considered in helping arrive at an answer to this foundational question.

Reed writes convincingly that only after this "why" question is correctly answered and used as a template for other questions about Creation can they be set in the right context and properly answered. The "how" and "when" issues are carefully and analytically addressed in Chapters 3 and 4, respectively. What are the answers to the fundamental "why" question and the subordinate questions? I will leave the intriguing answers and insights found in this informative book for the readers to discover just as I enjoyed doing. John Reed has given readers an excellent work that gives a solid, Bible-based starting point from which to best answer questions about Creation.

In the closing chapter is found an encouraging challenge for Christians. At the end of the book, the reader can find a bibliography, selected Scriptures from Jonathan Edward's dissertation, a list of resources to help in answering crucial questions about the Creation, and information about Word Ministries. I highly recommend this book and those of high school age and older will find it very informative. The book is available from the Creation Research Society.

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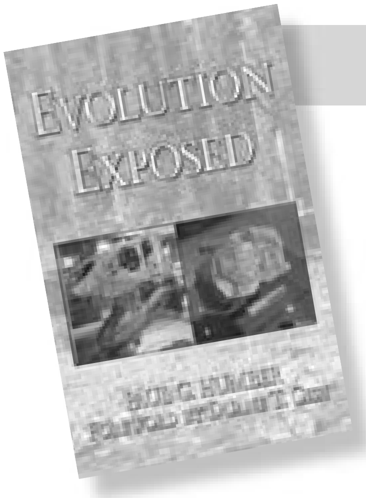

Book Review

Evolution Exposed

by Paul Humber

Pleasant Word, Enumclaw, WA, 266 pages, $12.95.

Evolution Exposed covers very different material than most books on this subject. Only chapter 3 includes the traditional scientific evidence for creation - material covered in many other books. Rather, this book is a very readable personal first person account about Humber's many activities in the biblical creation area. He includes much material found nowhere else including a whole chapter on his eye-opening correspondence with Richard Dawkins and other famous Darwinists. His correspondence with actor Kirk Douglas about the film *Inherit the Wind* was, for me, very revealing. Douglas played William J. Bryan in one of the film versions of the play.

Humber, an educator who has taught from secondary school through the college level, stresses that, although many of the evolutionists he has corresponded with resorted to vile name calling, such as calling him stupid, ignorant, closed-minded, a liar and such, Darwin skeptics should never resort to these tactics when debating with what Stephen J. Gould calls Darwin Fundamentalists. Humber provides several examples where he maintained his civility in the face of a barrage of invectives from Darwinian critics.

Humber also includes much interesting material on the past and present detrimental effects of Darwinism on American society, such as reviewing the writings of Planned Parenthood founder, eugenicist Margaret Sanger. Another example is Cornell University's Carl Sagan, one of the most well-known popularizers of science in the last half of the twentieth century. Sagan argued that life in the human womb traces our evolutionary history from worm to human. Comparing the appearance of the early developing embryo to "a segmented worm," then a fish, Sagan wrote that "something like the gill arches of a fish or an amphibian ... become conspicuous, and there is a pronounced tail" at this stage of human development. Sagan also claimed that, as development proceeded, the human face becomes "reptilian ... (then) somewhat pig-like." Eventually, as we retrace our evolution, Sagan concluded that we resemble a primate but are "still not quite human" (p. 140).

The implications of this just-so-story are obvious: Until we develop into the human stage, killing a human fetus is not murder. Sagan wrote that we "must decide...what distinguishes a human being from other animals and when, during gestation, the uniquely human qualities—whatever they are—emerge" (p. 140). The influence of Darwinism on Hitler, Marx, Engels, Lenin, Stalin and others is discussed in some detail.

The positive influence of creation on scientists such as George Washington Carver is documented. Humber also includes a section on Islam, showing that its teachings in the Qur'an affirms a view of creation that is very similar to that taught by Christianity for the past 2,000 years. In an appendix, Humber includes a brief autobiography detailing the influence of creation on his life and religious conversion.

One of the most important sections of the book is the account of Humber's very successful program to teach public school students in 11 schools about creation during school time. Although initially challenged by a prominent lawyer for the school district of Philadelphia, Humber was successfully able to defend his program. He explains in some detail how he started the program and how he successfully dealt with the many challenges to it by secular humanists and others. Why his approach is not used throughout the United States is baffling.

The connection of evolution to secular humanism is well-documented. The account in chapter 21 about a doctored Neanderthal cast documents an example of a misleading artifact in paleontology. Humber also discusses the research of Dr. Mary Schweitzer on the soft, flexible tissue that her lab extracted from *Tyrannosaurus rex* bone and its implications for a young Earth or, at the least, a more recent existence of the Dinosaurs. In short, this work is a very readable collection of writings on biblical creation, the effects of Darwinism on Society, and some of the scientific and other evidence for this worldview. The personal accounts add much insight to the book. Although clearly advocating biblical creation, this very useful book includes a great deal of original material that anyone who is interested in this subject, no matter on which side of the controversy, will find enlightening.

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Creation and Genesis: A Historical Survey

Andrew S. Kulikovsky*

Abstract

Analysis of the historical development of doctrines and theological motifs is a crucial but often neglected element of the interpretive process. Such investigations protect the interpreter from making the common mistake of reading later ideas back into the biblical text. This survey outlines the major views on Creation and the age of the earth advocated by Christians and Jews throughout history. I also analyzed the influence of scientific naturalism and evolutionary theory on biblical interpretation. Although the survey is by no means exhaustive, it is, nevertheless, intended to be a fair and faithful representation of the major views and their adherents.

Introduction

Analysis of the historical development of doctrines and theological motifs is a crucial but often neglected element of the interpretive process. Such investigations protect the interpreter from making the common mistake of reading later ideas back into the biblical text (Osborne, 1991). It is unfortunate that many modern writers have done exactly this, resulting in a great deal of misrepresentation of the church's historical views concerning the Genesis cosmogony, the days of Creation, and the age of the earth. Particularly poor have been the treatments by Ross (1994), Ross and Archer (2001), Stoner (1997), and Forster and Marston (1999).

Fortunately, there has also been some outstanding historical scholarship in this area—in particular, the work of Lewis (1989), Hall (1999a, 1999b), Hall and Duncan (2001a, 2001b), and Mortenson (1997, 2004) among others. This survey is indebted to their work and draws heavily from it.

Early Jewish and Christian Commentators (BC–AD 500)

The rabbinic writings reflect many different views concerning the Creation account, and most comments tend to relate to various details in the text rather than the temporal implications of the days of Creation. Nevertheless, R. Judah stated that the world "was created in six days, for in the account of each day it is written, 'and it was so'" (Urbach, 1975, p. 192).

Concerning the problem of day and night existing before the sun and moon, the talmudic writers concluded that time was created separately, and that "God fixed the duration of the day and night and then arranged for the appearance of the sun and moon to conform therewith" (Cohen, 1995, pp. 36–37).

The Jewish historian Josephus made a number of comments about the days of Creation in book 1 of his *Antiquities of the Jews*. Although he promised a separate treatise on the days—a promise he apparently did not keep—his other comments indicate that he almost certainly understood the days literally. Regarding the first day, he wrote, "The name he gave to one was *Night*, and the other he called *Day:* and he named the beginning of light, and the time of rest, *The Evening* and *The Morning*, and this was indeed the first day. But Moses said it was one day" (Josephus, 1999, p. 49). He continued: "Accordingly Moses says, that in just six days the world, and all that is therein, was made. And that the seventh day was

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Accepted for publication August, 21, 2006

a rest, and a release from the labor of such operations; whence it is that we Celebrate a rest from our labors on that day, and call it the Sabbath." Furthermore, regarding the exposition of Genesis 2:4 onwards, Josephus commented, "Moses, after the seventh day was over begins to talk philosophically" (Josephus, 1999, p. 49), which indicates that Josephus understood the Genesis 1:1–2:4 as straightforward historical narrative rather than primarily a philosophical or theological statement.

Forster and Marston (1999, pp. 192–198), however, argue that the Jewish readers of Genesis 1–3 understood much of it as allegorical rather than as literal history. In support, they appeal to Philo and the Targums. Their claims, however, are without substance. First, Philo (ca. 20–15 BC to AD 45–50) was a Hellenistic Jew who could not read Hebrew (Runia, 1991, p. 2). Not surprisingly, his writings are almost totally free of rabbinic concerns. Instead, he resorted to "an extensive allegorical interpretation of Scripture that made Jewish law consonant with the ideals of Stoic, Pythagorean, and especially Platonic thought" (Achtemier, 1985, "Philo"). Philo clearly was more concerned with harmonizing the Old Testament with Greek philosophy than with careful exegesis. Thus, to appeal to Philo as a representative of all Jewish readers has no justification. Note, however, that Philo's philosophical ideas and allegorical method had a direct impact on Christian theology through the writings of Clement of Alexandria (AD 150–215) and Origen (ca. AD 185–254).

Second, the Targums (Aramaic paraphrases of the Old Testament) vary greatly in their literalness and in the way they expound the text (Payne, 1996). Citing a relatively minor Targum edition (*Targum Neofiti*, dating from the third century AD) proves very little, especially since *Targum Onkelos* was actually the official version of the Babylonian Jews.

Regarding the beliefs of the Christian church, Davis Young (1982) provides a good survey of the views held by Christians over the centuries and concludes that "the concept of a recent creation was a virtually unanimous belief of the early church….Many of the church fathers plainly regarded the six days as ordinary days" (p. 19 & 21). Up until the eighteenth century, virtually the entire Christian world believed the earth was only a few thousand years old. It was not until the development of geological investigation that some churchmen began questioning this belief and proposing alternative non-literal interpretations of the days of Creation in Genesis 1.

Forster and Marston (1999, p. 38), on the other hand, claim that nonliteral interpretation of the Creation days is *not* a modern idea, and that important mainstream church leaders had taught such views from the beginning. Paul Elbert (1996) concurs and includes Irenaeus, Origen, Basil (329–379), and Augustine (354–430) among those who viewed the days of Creation as phases. Yet Forster and Marston (1989, see p. 205) also acknowledge that Barnabas (b. AD 100), Irenaeus (ca. 120–202), Hippoplytus (170–236), Methodius (260–312), Lactantius (ca. 260–330), Theophilus (ca. 115–188), and John of Damascus (ca. 675–749) all understood the days as corresponding to seven ages of a seven-thousand year world history. In other words, the totality of world history could be broken down into seven ages, each of which lasts for one thousand years. It follows, then, that all these writers believed the creation was not more than seven thousand years old.

A number of early commentators understood *b^{e}yôm* ("in the day") in Genesis 2:4 as a reference to "instantaneous" creation. In *De Opificio Mundi*, Philo wrote: "And he says that the world was made in six days, not because the Creator stood in need of a length of time (for it is natural that God should do everything at once, not merely by uttering a command, but by even thinking of it)" (Yonge, 1993, p. 4). Origen (Roberts et al., 1994a, vol. 1, *Against Celsus* 6.49, 50, 60; *De Principiis* 4.3.1), Athanasius (ca. 296–373) (Roberts et al., 1994c, vol. 4, *Orations* 2.48–49) and Augustine (Taylor, 1982, vol. 1, *The Literal Meaning of Genesis*) held a similar view and discussed how it could be harmonized with the six days.

Comments on the days of Genesis are sparse in Christian writings of the second century, and, as Lewis (1989) noted, there is a marked tendency to allegorize the days. Theophilus (Roberts et al., 1994a, vol. 2, *To Autolycus* 2.10–18), in his discussion of Creation, regarded the days as normal 24-hour days, but also applied various typological understandings to them. Young (1982, see p. 21) claims that Clement of Alexandria interpreted the days allegorically but admits that it is unclear whether he also considered the days to be literal. However, the following comment from *The Stromata* indicates otherwise: "And they purify themselves seven days, the period in which Creation was consummated. For on the seventh day the rest is celebrated; and on the eighth he brings a propitiation, as is written in Ezekiel" (Roberts et al., 1994a, vol. 2, *The Stromata* 4.25). Even more compelling is Clement's statement in *The Stromata* 6.16:

> For the creation of the world was concluded in six days. For the motion of the sun from solstice to solstice is completed in six months—in the course of which, at one time the leaves fall, and at another plants bud and seeds come to maturity. And they say that the embryo is perfected exactly in the sixth month, that is, in one hundred and eighty days in addition to the two and a half, as Polybus the physician relates in his book *On the Eighth Month*, and Aristotle the philosopher in his book *On Nature* (Roberts et al., 1994a, vol. 2, *The Stromata* 6.16).

Both of these comments refer to

"days" and "months" as normal, common periods of time.

Although Origen regularly applied a nonliteral hermeneutic, he "did not usually deny the literal sense of the biblical text but used it as a vehicle to get at other 'higher' meanings within a scheme of three levels of interpretation" (Stallard, 2000, p. 16). Origen saw a triple sense in Scripture: the literal, the moral, and the spiritual. If difficulties resulted from a literal reading of Scripture, then he suggested a spiritual meaning should be sought, and he applied this hermeneutic to the days of Creation (Lewis, 1989).

Basil, on the other hand, rejected any allegorical interpretation of Genesis:

> For me grass is grass … I take all in the literal sense…. It is this which those seem to me not to have understood, who, giving themselves up to the distorted meaning of allegory, have undertaken to give a majesty of their own invention to Scripture. It is to believe themselves wiser than the Holy Spirit, and to bring forth their own ideas under a pretext of exegesis. Let us hear Scripture as it has been written (Roberts et al., 1994c, vol. 8, *Homilies on Hexaemeron* 9.1).

Likewise, Gregory of Nyssa (335–395) claimed in *Explicatio Apologetica in Hexaemeron* that he never resorted to allegorical interpretation, although some scholars dispute this (Lewis, 1989). In *Against Eunominus* he wrote: "The creation, as we have said, comes into existence according to a sequence of order, and is commensurate with the duration of the ages, so that if one ascends along the line of things created to their beginning, one will bound the search with the foundation of those ages" (Roberts et al., 1994c, vol. 5, *Against Eunominus* I.24). While this may at first appear to indicate a belief in the day-age interpretation, the context suggests that Gregory's use of the term "creation" refers not to Creation week but to the entire time span over which the creation has existed, from the initial act "in the beginning" up until the present day.

Of all the early commentators, Basil probably gave the clearest explanation of his interpretation of the days:

> Why does Scripture say "one day the first day"? Before speaking to us of the second, the third, and the fourth days, would it not have been more natural to call that one the first which began the series? If it therefore says "one day," it is from a wish to determine the measure of day and night, and to combine the time that they contain. Now twenty-four hours fill up the space of one day—we mean of a day and of a night; and if, at the time of the solstices, they have not both an equal length, the time marked by Scripture does not the less circumscribe their duration. It is as though it said: twenty-four hours measure the space of a day, or that, in reality a day is the time that the heavens starting from one point take to return there. Thus, every time that, in the revolution of the sun, evening and morning occupy the world, their periodical succession never exceeds the space of one day (Roberts et al., 1994c, vol. 8, *Homilies on Hexaemeron* 2.8).

Following Basil, Ambrose (339–397) (Ambrose, 1977, *Hexaemeron* 3.8, 2.2) also understood the days literally and explicitly stated that the days were of twenty-four hours in length. Regarding the first day of creation, he stated that "one day" is used instead of "the first day" because it is the foundation of all others things and should not to be compared to the other days.

Chrysostom (347–407) also appears to take the days literally. Commenting on Genesis 1:5, he wrote:

> Then, when he had assigned to each its own name, he linked the two together in the words, 'Evening came, and morning came, one day.' He made a point of speaking of the end of the day and of the end of the night as one, so as to grasp a certain order and sequence in visible things and avoid any impression of confusion (Chrysostom, 1986, vol. 3, pp. 10–11).

Augustine was inclined to think God created all things in a moment of time, and the days were simply introduced to aid the finite human intelligence (Lavallee, 1989). In *The City of God*, he wrote,

> What kind of days these were it is extremely difficult, or perhaps impossible for us to conceive, and how much more to say!…We see, indeed, that our ordinary days have no evening but by the setting, and no morning but by the rising, of the sun; but the first three days of all were passed without sun, since it is reported to have been made on the fourth day. And first of all, indeed, light was made by the word of God, and God, we read, separated it from the darkness, and called the light Day, and the darkness Night; but what kind of light that was, and by what periodic movement it made evening and morning, is beyond the reach of our senses; neither can we understand how it was, and yet must unhesitatingly believe it (Roberts et al., 1994b, vol. 2, *The City of God* 11.6–7).

Therefore, Augustine interpreted the days of Creation allegorically. Nevertheless, other remarks indicate that he was not entirely happy with this view, even to the point of reluctant acceptance, and in *The Literal Meaning of Genesis*, he expressed some openness to considering other views:

> Whoever, then, does not accept the meaning that my limited powers have been able to discover or conjecture but seeks in the enumeration of the days of creation a different meaning, which might be understood not in a prophetical or figurative sense, but literally and more aptly, in interpreting the works of creation, let

> him search and find a solution with God's help. I myself may possibly discover some other meaning more in harmony with the words of Scripture (Taylor, 1982, vol. 1, *The Literal Meaning of Genesis* 4.28.45).

Note that although Augustine held to an allegorical interpretation, he did not believe in an ancient world. In his response to the Egyptians' "one hundred thousand year chronology," he stated that the world was less than six thousand years old.

> For as it is not yet six thousand years since the first man, who is called Adam, are not those to be ridiculed rather than refuted who try to persuade us of anything regarding a space of time so different from, and contrary to, the ascertained truth? For what historian of the past should we credit more than him who has also predicted things to come which we now see fulfilled? And the very disagreement of the historians among themselves furnishes a good reason why we ought rather to believe him who does not contradict the divine history which we hold (Roberts et al., 1994b, vol. 2, *City of God* 18.40).

One Syriac manuscript indicates the Syrian fathers considered evening and morning (Gen 1:5) to be true measures of time, even though the sun and moon had not yet been created. They believed darkness was created first and lasted twelve hours, and then light was created and lasted twelve hours. This was called "day," and Scripture says "one day" rather than "first day" so that "it should not be thought that just as we know the days now, even so they were formed in the first instance" (Levene, 1951, pp. 73, 131–132). In other words, because the term "first" describes the relation of this day to the following days, it is not an appropriate descriptor since, at that time, the following days did not exist.

While all the early creeds speak of God as the maker of heaven and earth, they do not mention the six days. This should not be surprising given that the creeds were written to clarify elements of Christian doctrine, and therefore reflect only the various doctrinal controversies in the early church. Thus, the early creeds focused on the Trinity and the Person of Christ, which had been the center of controversy in the early church. Likewise, the Reformation creeds focused on the differences between Protestantism and Roman Catholicism. Nevertheless, almost all the early Gentile Christians had turned from pagan evolutionary ideas (Lavallee, 1993), and believed that God had created the universe either in six days or in an instant.

The Middle Ages and the Reformers (1000–1700)

Jewish commentators Rashi (Rabbi Shlomo Yitzchaki, 1040–1105), Ibn Ezra (Abraham ben Meirmâr, ca. 1089–1164), Maimonides (1135–1204), and Gersonides (Levi ben Gerson, 1288–1344) rejected literal interpretations in favor of allegorical and nonchronological approaches. However, William Turner noted that Maimonides was heavily influenced by Greek philosophy (Broderick, 1990), and Tamar Rudavsky has pointed out that Gersonides staunchly defended the Platonic theory of Creation and regarded human reason above Scripture as the most important criterion for determining truth (Rudavsky, 2002).

Following Barnabas, Irenaeus, Methodius, and other early church fathers, Peter Lombard (d. 1164) and Hugo of St. Victor (1097–1141) also believed God created both in an instant and in six days. Arnoldus of Chartres (ca. 1160), on the other hand, held to an early "days of revelation" view in which each day refers to the order in which the world was unfolded to Adam (Lewis, 1989).

Thomas Aquinas (1225?–1274), in his treatise on the six days in *Summa Theologica*, considers many philosophical questions connected with Creation. He believed in seven distinct days rather than one only, which constituted "a succession both in time, and in things produced" (Book I, 74.2). Regarding the length of the days, Aquinas (Book I, 74.3) wrote, "The words 'one day' are used when the day is first established, to denote that one day is made up of twenty-four hours. Hence, by mentioning 'one,' the measure of a natural day is fixed."

Guillaume Salluste DuBartas (b. 1544) and Francisco Suarez (1548–1617) preferred the strictly literal view of the Creation days (Lewis, 1989), as did the reformer, Martin Luther (1483–1546), who understood the terms "evening and morning" as a reference to a natural day of twenty-four hours "during which the *primum mobile* revolves from east to west" (Luther, 1958, p. 48). Philip Melanchthon (1497–1560), on the other hand, apparently believed that Creation occurred in both six days and in an instant (Lewis, 1989). Calvin (1509–1564), however, was unimpressed with the idea of instantaneous creation, and responded as follows:

> Here the error of those is manifestly refuted, who maintain that the world was made in a moment. For it is too violent a cavil to contend that Moses distributes the work which God perfected at once into six days, for the mere purpose of conveying instruction. Let us rather conclude that God himself took the space of six days, for the purpose of accommodating his works to the capacity of men (Calvin, 1948, vol. 1, p. 78).

While it is well known that James Ussher (1581–1656), Archbishop of Armagh, interpreted the days literally and calculated the date of Creation to be 4004 BC, John Lightfoot (1602–1675), his contemporary and the leading Hebrew scholar at that time, also interpreted the days literally and calculated a similar date of 3960 BC. Lightfoot wrote:

> So that look at the first day of the creation, God made heaven and earth in a moment. The heaven, as soon as created, moved, and the wheel of time began to go: and thus, for twelve hours, there was universal darkness. This is called the 'evening,' meaning night. Then God said, 'Let there be light;' and light arose in the east, and, in twelve hours more, was carried over the hemisphere: and this is called, 'morning,' or 'day.' And the evening and morning made the first natural day; twelve hours, darkness—and twelve, light (Pitman, 1822–25, vol. 7, p. 373).

Although allegorical interpreters still could be found during the Middle Ages, they nonetheless assumed the literal meaning of the text was truthful. The allegorical hermeneutic was applied to the text only in order to discover deeper spiritual meanings. As Woodbridge (1985, p. 199) pointed out, "the allegorization program of most interpreters was not intended to throw disrepute on the accuracy of the biblical accounts."

At this point it is important to note that a major philosophical and theological shift was occurring in the church throughout this period. Ideas and influences external to Scripture had an increasing impact on both the church and society as a whole, especially Greek philosophy. David Lindberg and Ronald Numbers (1986, p. 342) noted that:

> by the beginning of the thirteenth century, virtually all of the works of Aristotle had become available in Europe, and from this point onward we see a persistent effort to integrate Aristotelian natural philosophy, or science, with Christian theology. In the end, Christianity took its basic categories of thought, its physical principles, and much of its metaphysics and cosmology from Aristotle. By means of its power to organize and interpret human experience, Aristotelianism conquered Christendom.

Note also that it was this broad acceptance of Aristotelian thought and cosmology by the church, and the academic community that apparently led to the heliocentric controversy involving Galileo (Schirrmacher, 2000).

Furthermore, due to the increasing influence and authority given to the natural sciences, many commentators started believing in the great antiquity of the earth. Episcopius (1586–1643) advocated a "gap theory" in which a long period of time passed between Genesis 1:1 and 1:2. R. Obadiah, around 1698, argued from Psalm 90:4 that each Creation day may be a thousand years (Lewis, 1989). This is probably why, as Lavallee (1993) noted, church creeds written in the seventeenth century explicitly affirmed the six days of Creation.

The first creed mentioning the six Creation days was the *Irish Articles* from the Irish Episcopal Church, which was adopted in 1600. This later became the model for the *Westminster Confession*. Article 18 reads: "In the beginning of time, when no creature had any being, God, by his word alone, in the space of six days, created all things" (Lavallee, 1993).

In the Netherlands, the Mennonites wrote their *Dordrecht Confession* in 1632, in which the first article reads: "In this one God, who 'worketh all in all,' we believe. Him we confess as the Creator of all things, visible and invisible; who in six days created and prepared 'heaven and earth, and the sea, and all things that are therein'" (Lavallee, 1993). Later in the century, the Amish also adopted this confession, and it remains authoritative in many of these communities (Lavallee, 1993).

The *Westminster Confession*, completed in 1646, was the core doctrinal statement of the Presbyterian Church. Article 5.1 states: "It pleased God the Father, Son, and Holy Ghost, for the manifestation of the glory of His eternal power, wisdom, and goodness, in the beginning, to create, or make of nothing, the world, and all things therein whether visible or invisible, in the space of six days; and all very good." The Confession also formed the basis for the *Congregational Savoy Declaration* of 1658 and the *Baptist London Confession* of 1689. Both affirmed Creation in the space of six days (Lavallee, 1993). Some have questioned whether the authors of the Westminster Confession really intended the statement "in the space of six days" to be taken as a reference to 24-hour days. However, Hall (1999a) has convincingly shown that those divines who discussed the days all held to 24-hour days.

The Enlightenment

In the seventeenth and eighteenth centuries, most Christian naturalists based their hypotheses about earth history on an essentially literal reading of the biblical account of Creation and the Flood (Young, 1987), and the belief in a lengthy earth history was adhered to only by a small group of naturalists (Rudwick, 1986, p. 309). Davis Young acknowledged that "the almost universal view of the Christian world until the eighteenth century was that the earth was only a few thousand years old. Not until the development of modern scientific investigation of the Earth itself would this view be called into question within the church" (Young, 1982, p. 25).

The Enlightenment was an eighteenth-century phenomenon that had its philosophical roots in the seventeenth century. The human mind was freed from its philosophical and religious shackles, making it totally autonomous. McCune (1998, p. 6) observed, "It was a movement in thought, sometimes known as the Age of Reason, that was totally secular."

Miles (1991) noted that the eighteenth century is generally regarded as a golden age for science while at the same time religion began to be eroded by the rise of rationalism, materialism, deism, agnosticism, scepticism, and secularism.

Naturally, this kind of thinking had a significant impact on Christianity and the church. Society became autonomous and totally free intellectually. No longer were people bound by church creeds, theological statements, revelation, or any particular worldview or presuppositions of any kind. Man was intellectually independent in an open universe of chance, relativism, and inevitable change in all areas (McCune, 1998).

Second, the Enlightenment denied the need for divine revelation. Revelation was no longer thought to be necessary since man could learn just as much about God and the world through science and reason (McCune, 1998). Previously, reason was initially guided by, and subordinate to, biblical revelation, but soon the domain of biblical revelation became severely restricted—no longer was it viewed as being more authoritative than science (Miles, 1991). Biblical revelation was to be understood only within the bounds of human reason, and its message and significance were essentially limited to issues of salvation and morality. Thus, Miles (1991) concluded that "science and reason in the 18th century directly undermined the authority of Scriptural revelation by elevating the status of reason."

Third, the Enlightenment also led to the beginning of the detachment of Christianity from history. Rather than Christianity being true because it is rooted in history and therefore dependent on the facts of history, theologians influenced by Enlightenment thinking became more concerned with Christianity's ability to transform lives through its morality and system of ethics. "Theology became more concerned about spiritual 'life' or the practical interests in the field of religion" (McCune, 1998, p. 8; cf. Hughes, 1992; Woodbridge, 1985).

It is not surprising, then, that during this period various Christian scholars began to argue that Scripture was not strictly historical (Hughes, 1992), and therefore contained "errors" in its descriptions of the Creation and the Flood. As a result scientists no longer felt the need to align their findings with biblical teachings. Indeed, many scientists argued that their conclusions about the "real world" should be given more authority than the "phenomenological" statements in the Bible pertaining to the physical creation. In other words, the Scriptures should conform to what science teaches and not vice versa (Woodbridge, 1985, see p. 261). Therefore, church creeds began to reflect these new ideas. Instead of incorporating the Westminster Confession's "in the space of six days," the 1890 English Presbyterian Articles of Faith read, "Almighty God…was pleased in the beginning to create the heavens and the earth…through progressive stages" (Lavallee, 1993).

It is important to emphasize, as McCune has, that Enlightenment thinkers "refused to be bound by anything such as revelation, dogma, and tradition" and that "the theoretical underpinnings were anti-Christian, pagan, and secular" (McCune, 1998, p. 7).

The Modern Period (1800–1900)

Again, up until the early nineteenth century, Jewish and Christian scholars alike agreed almost unanimously that the universe was created in six 24-hour days around six thousand years ago (Youngblood, 1991, p. 41). During the nineteenth century, however, this consensus began to be reversed, largely because of the rise of geological study and Darwin's theory of evolution.

The Influence of Geological Study

The fundamentals of geological study (fieldwork, collection of rocks and fossils, and theory construction) were not developed until the sixteenth to eighteenth centuries, and geology as a distinct discipline did not emerge until the seventeenth and eighteenth centuries, making it one of the younger sciences (Mortenson, 1997). Today there are basically two broad schools of thought in geological studies. The dominant and most widely held view is uniformitarianism, that observation in the present is the key to understanding the past. The minority view is catastrophism (or diluvialism), which postulates that the earth was shaped by major catastrophic events in the past. This is essentially the view held by "flood geologists" and those involved in the modern creation science movement. Note, however, that accepting catastrophism does not necessarily imply the acceptance of the kind of flood geology advocated by young earth creationists.

It is often stated that young earth creationism and flood geology originated with Seventh-Day Adventist George McReady-Price in *The New Geology* (1923) and was imported into mainstream evangelicalism by Henry M. Morris and John Whitcomb in their highly influential *The Genesis Flood* (Morris and Whitcomb, 1961). This understanding has become widely accepted due to Ronald Numbers's highly influential book *The Creationists* (Numbers, 1993), and Numbers's conclusions have been regurgitated by others, including Noll (1994), Ross (1998) and Sawyer (2002).

Unfortunately, this is another example of the misrepresentation and revisionism that has characterized much of modern historical study. Numbers, and those who repeat him, are wildly off the mark on this point. While McReady-Price, Morris, and Whitcomb were largely responsible for the revival of young earth creationism and flood geology in the twentieth century (particularly in the USA), similar ideas were advocated one hundred years earlier by the "scriptural geologists" in Great Britain. Mortenson (2004) shows that these Christians defended the biblical view of Creation and accepted the catastrophic impact of the global flood of Noah. Although many of the scriptural geologists were only amateur naturalists, some were highly knowledgeable and competent with respect to geological study and practice, when judged by the standards of their time (see Endnote 1). Even Davis Young (1987) acknowledged that flood geology (or diluvialism) "was not the aberrant theory of a fringe group; it was mainstream natural history and was espoused by some of the ablest naturalists of the [early- to mid-nineteenth century]" (p. 23). Young (1987) explained:

> In diluvialism, Scripture provided the main outline of terrestrial history. The writings of classical historians and scattered empirical evidence from the earth provided secondary sources of information that helped fill in the detail and were believed to corroborate the biblical accounts. The biblical scheme of creation, fall, flood, and final consummation provided the main events in earth history, and the biblical materials relating to these events were typically understood in literal terms. The creation was assumed to be a recent creation in six ordinary days, and the flood was assumed to be global. Typically, the Noahic flood was the centerpiece around which the various speculative theories of the earth were constructed. (p. 6–7.)

Note also that a number of early church fathers, including Tertullian, Chrysostom and Augustine, believed that fossils were the remains of former living things and attributed them to the Noahic flood (Mortenson, 1997).

In fact, numerous works on flood geology were published by the early geologists. Niels Steensen (1638–1686), a Dutch anatomist and geologist who established the principle that sedimentary rock layers were deposited in a successive and generally horizontal fashion, stated in his book *Forerunner* (1669), his belief in a six-thousand-year-old earth and that organic fossils and rock strata were laid down by the flood of Noah. Cambridge scholars, Thomas Burnet (1635–1715) and William Whiston (1667–1752), put forward theories on how the Noahic flood laid down the earth's surface structure (Porter, 1977, see p. 23). Burnet's *Sacred Theory of the Earth*, was originally published in 1681 and Whiston's *A New Theory of the Earth*, was released in 1696.

Physician and geologist John Woodward (1665–1722) invoked the Flood to explain the strata and fossils in *An Essay Toward a Natural History of the Earth* (1695). Alexander Catcott (1725–1779), in his *Treatise on the Deluge* (1768), invoked geological arguments to defend the Genesis account of a recent creation and a global flood that produced the geological record, and Richard Kirwan (1733–1812) advocated flood geology in his *Geological Essays* (1799). Yet, there were also some geologists at this time who believed the earth was much older than mankind, and that the Noahic flood was largely a geological nonevent (Mortenson, 1997).

In the latter part of the eighteenth century, as a result of Enlightenment thinking, geological study became increasingly secularized. Thus, in 1785, and before examining the evidence, James Hutton, a deist, proclaimed: "The past history of our globe must be explained by what can be seen to be happening now.…No powers are to be employed that are not natural to the globe, no action to be admitted except those of which we know the principle" (Holmes, 1965, pp. 43–44). According to Davis Young (1982), the "accumulating evidence from nature pointed in the direction of the vast antiquity of the Earth and forced theologians to take a much harder, more penetrating look at the biblical record than ever before" (p. 13). Therefore, Thomas Chalmers in 1804 declared that "the writings of Moses do not fit the antiquity of the globe" and several years later published a book containing a "gap theory" interpretation of Genesis 1:1–2 (Lewis, 1989, p. 453).

Hutton's theory was essentially uniformitarian—the operation of slow and gradual physical processes, and he, too, believed the Noahic flood was a geological nonevent. In 1802, John Playfair (1748–1819), a Scottish clergyman and mathematician published *Illustrations of the Huttonian Theory of the Earth*, which repackaged Hutton's views in a more digestible and less overtly deistic format. Playfair made no attempt to harmonize his views with Scripture, nor did he attribute any geological significance to the Noahic flood (Mortenson, 1997).

Nevertheless, in the 1820s, old-earth catastrophist (or diluvial) geology was generally accepted by most geologists and academic theologians. William Buckland (1784–1856) was the leading geologist in England in the 1820s. Although he believed the earth was very old, in his 1820 work *Vindiciae Geologicae*, he argued that geology was consistent with Genesis and offered numerous convincing proofs of the global catastrophic Noahic flood (Mortenson, 1997). However, Buckland's convictions about the truth of Scripture soon began to waiver. In his personal correspondence in the 1820s, he confessed to viewing geological data as more reliable and superior to textual evidence in determining Earth's history (Rupke, 1983, p. 41–47).

Prompted by the writings of another Scottish minister, John Flemming, Charles Lyell (1797–1875), a lawyer by training, revived Hutton's ideas in his famous three-volume work, *Principles of Geology* (1830–1833). Like Hutton, Lyell was not concerned with harmonizing his views with Scripture, but saw himself as "the spiritual savior of geology, freeing the science from the old dispensation of Moses" (Porter, 1976, p. 91).

Although Buckland had been a great defender of catastrophism, he changed his mind in light of Flemming's and Lyell's criticisms, and he too eventually concluded that the Noahic flood was tranquil and geologically insignificant (Buckland, 1836, see pp. 16, 94–95).

Adam Sedgwick (1785–1873), Buckland's counterpart at Cambridge University, also advocated old-earth diluvialism. In 1825, he wrote:

> The sacred record tells us—that a few thousand years ago 'the fountains of the great deep' were broken up—and that the earth's surface was submerged by the water of a general deluge; and the investigations of geology prove that the accumulations of alluvial matter…were preceded by a great catastrophe which has left traces of its operation in the diluvial detritus which is spread out over all the strata of the world.
>
> Between these conclusions, derived from sources entirely independent of each other, there is, therefore, a general coincidence which is impossible to overlook, and the importance of which it would be most unreasonable to deny. The coincidence has not been assumed hypothetically but has been proved legitimately, by an immense number of direct observations conducted with indefatigable labour, and all tending to the establishment of the same general truth (Hallam, 1989, p. 43).

Yet, several years later, after the first volume of Lyell's *Principles* was published in 1831, Sedgwick too abandoned this view.

> Bearing upon this difficult question, there is, I think, one great negative conclusion now incontestably established—that the vast masses of diluvial gravel, scattered almost over the surface of the earth, do not belong to one violent and transitory period. It was indeed a most unwarranted conclusion….We saw the clearest traces of diluvial action, and we had, in our sacred histories, the record of a general deluge.
>
> To seek the light of physical truth by reasoning of this kind, is, in the language of Bacon, to seek the living among the dead, and will ever end in erroneous induction. Our errors were, however, natural, and of the same kind which lead many excellent observers of a former century to refer all the secondary formations of geology to the Noachian deluge. Having been myself a believer, and, to the best of my power, a propagator of what I now regard as a philosophic heresy, and having more than once been quoted for opinions I do not now maintain, I think it right, as one of my last acts before I quit this Chair, thus publicly to read my recantation….We ought, indeed, to have paused before we first adopted the diluvian theory (Sedgwick, 1831, pp. 312–314).

Thus, Lyell's *Principles of Geology* became highly influential and sounded the death knell for both old-earth and young-earth diluvialism. By the mid to late 1830s, virtually all geologists accepted Hutton's and Lyell's uniformitarian convictions. The only significant exceptions were the so-called "scriptural geologists" in Great Britain—men such as George Young (1777–1848), George Fairholme (1789–1846), William Rhind (1797–1874), John Murray (1786?–1851), Andrew Ure (1778–1857), and Granville Penn (1761–1844). These men opposed Hutton's and Lyell's uniformitarian theories as well as the catastrophic theories of William Buckland, Georges Cuvier, William Conybeare, and Adam Sedgwick. Despite the title ascribed to them, it is important to note that the scriptural geologists' objections to an old earth were often based on actual geological information and observation, not just on Scripture. In fact, contra Davis Young and others, many of the scriptural geologists had significant geological knowledge, and a few were just as knowledgeable and capable as any of the leading geologists at that time (Mortenson, 1997).

Nevertheless, the arguments presented by the scriptural geologists were completely ignored. Historian Charles Gillespie (1951) condescendingly suggested that "their errors cannot have seemed sufficiently damaging to science to merit professional refutation because no one bothered to refute them" (p. 163). Indeed, as Mortenson (1997) has documented, responses to the scriptural geologists by their contemporaries amounted to nothing more than cavalier dismissal and *ad hominem*.

Thus, the old-earth uniformitarian views of Hutton and Lyell soon became the consensus among virtually all geologists, including those who held conservative evangelical views. However, the cost of accepting such views meant the subordination of Scripture to geological data. Rudwick (1986) observed:

> Traditionally, non-biblical sources, whether natural or historical, had received their true meaning by being fitted into the unitary narrative of the Bible. This relationship now began to be reversed: the biblical narrative, it was now claimed, received its true meaning by being fitted, on the authority of self-styled experts, into a framework of non-biblical knowledge. In this way the cognitive plausibility and religious meaning of the biblical narrative could only be maintained in a form that was constrained increasingly by non-biblical considerations. (p. 306.)

This is clearly demonstrated by the response of the New England clergy in the United States. In 1849, *Bibliotheca Sacra*, the leading New England journal, published a paper by Cuvier in which he argues both for a recent creation of the earth and a universal deluge. Because of Cuvier, New England clergy rejected the old-earth views as well as Lyell's uniformitarianism (Hannah, 1983). However, Hannah (1983) noted that the New England clergy apparently misinterpreted Cuvier as defending a young earth. Cuvier was actually an old-earth catastrophist and believed the earth had experienced periodic catastrophes each of which left an impact in the geological record. Thus, in his paper, Cuvier was simply referring to the most recent catastrophe.

This situation quickly changed, however, and by the mid 1850s *Bibliotheca Sacra* began publishing articles clearly influenced by uniformitarian geology. Most clergy became convinced by the new "facts" and accepted either the day-age theory or the gap theory (Hannah, 1983).

This change in position appears to have occurred with virtually no opposition, even though a radical re-interpretation of the Genesis account was required in order to maintain the doctrine of inerrancy. John D. Hannah shows that this painless transition was largely the result of the influence of Benjamin Silliman, a geologist at Yale College, where the clergy of that time were trained. In 1829, Silliman affirmed that the Genesis account was strictly compatible with the facts of geology and paleontology, but a decade later he could only assert that the correspondence between the two was approximate. Wishing to maintain his deep religious commitment as well as the integrity of geology, he reinterpreted the Genesis account in terms of a day-age view and instilled the same thinking into a generation of clergymen. Moreover, when Silliman retired, he was succeeded by James Dwight Dana, his former student and son-in-law, who continued to propagate the same old-earth views (Hannah, 1983).

Others who held to old-earth views due to their convictions about the geological data included George S. Faber (1773–1854), who advocated the day-age view in his *Treatise on the Genius and Object of the Patriarchal, the Levitical, and the Christian Dispensations* (1823). Hugh Miller (1802–1856) in *Testimony of the Rocks* (1856) interpreted the six days as being six geological ages, as did F. de Rougemont, G. P. Pianciani, Delitzsch, Gultler, Secohi, and Pesnel (Lewis, 1989).

As noted above, Thomas Chalmers (1780–1847) in his *Evidences of Christianity* (1813) proposed the gap theory interpretation, which postulates that there was a long period of time between Genesis 1:1 and 1:2. This interpretation was later taken up by G. W. Pember in 1876 and was greatly popularized by the notes of the *Scofield Reference Bible* and by Harry Rimmer in *Modern Science and the Genesis Record* (1937). James Murphy (1887) and Herbert Morris (1871) also defended the gap theory in their writings.

Another view was to treat the Genesis account as merely a description of the creation of the garden of Eden. This "local creation" theory was proposed by John Pye Smith (1774–1851) in *On the Relation Between the Holy Scriptures and Certain Parts of Geological Science* (1840), and more recently by Sailhamer (1996).

Yet another nonliteral way of dealing with the six days is the "days of revelation" or "pictorial-day" theory, which argues that the Creation did not actually occur in six days but was merely *revealed* in six days. Advocates include P. J. Wiseman (1958) and Bernard Ramm (1955, see pp. 218–229).

Note also that the change in thinking about Creation and the Flood was aided by the introduction of critical biblical scholarship and liberal theology. Lindberg and Numbers (1986) pointed out that:

> professional geologists, who embraced Charles Lyell's admonition to study geology 'as if the Scriptures were not in existence,' joined professional biblical scholars, who adapted Benjamin Jowett's advice to 'interpret the Scriptures like any other book'…In this version of the encounter between Genesis and geology, critical biblical scholarship played as important a role in fostering scientific geology as did empirical investigation. (p. 13.)

Darwin and Evolution

Some commentators deny that evolutionary theory had anything to do with the change in views regarding the days of Creation, and the age of the earth. Forster and Marston, for example, claimed that the shift came as a result of the empirical geological evidence alone.

> It should be noted that this was all before Darwin published the Origin of Species in 1859, and that virtually all the geologists involved rejected evolution—including Charles Lyell. There was no sense in which evolution was assumed by those who constructed the geological column, and, as we will show in a later section, some of the key geologists were evangelical Christians (Forster and Marston, 1999, p. 219).

However, both Hutton and Lyell were deists and therefore rejected the notion of a personal creator God. In essence, the laws of nature became their God. In fact, in an unpublished paper written in 1794, Hutton clearly advocated a form of evolution by natural selection (Pearson, 2003). Lyell too, although he objected to *Lamarckian* evolution, eventually came to accept Darwinian evolution (Mortenson, 1997).

Moreover, it has long been recognized that Darwin did not invent the idea of evolution. As Livingston (1997) noted, "That idea was already common currency in embryological thought and in theories of social development long before Darwin's imaginative synthesis" (p. 282). Indeed, Bergman (2001) has shown that evolutionary ideas can be traced as far back as Thales of Miletus (640–546 BC), who was apparently the first to advance the idea that life originated in water and held views of biological evolution similar to those of modern times. Anaximander (611–547 BC), a student of Thales, developed these ideas further and concluded that humans evolved from fish. Greek philosopher Empedocles (493–435 BC) believed that chance was responsible for the entire process of human evolution. He also advocated spontaneous generation, gradual evolution by trial-and-error recombination, and natural selection as the primary mechanism of evolution. Also, Aristotle (384–322 BC) claimed humans are the highest point of a long, continuous "ascent with modification" of life.

In France, Charles De Secondat Montesquieu (1689–1755) developed a modern theory of evolution, and Benoit de Maillet (1656–1738) held that birds, mammals, and humans evolved from fish. His book on evolution was published posthumously in 1748. Georges-Louis Leclerc, Comte de Buffon, included discussions of evolutionary concepts in his *Historie Naturelle*, a forty-four volume encyclopedia describing everything known about the natural world. He also published *Les Epoques de la Nature* (1788) in which he openly suggested that the planet was much older than the 6,000 years proclaimed by the church and discussed "uniformitarian" concepts very similar to those that were later formulated by Charles Lyell. John-Bapiste Lamarck (1744–1829) proposed four laws of gradual evolutionary transformation in his *Philosophie Zoologique* (1809). Étienne Geoffroy St. Hilaire (1772–1844) also discussed evolutionary concepts in *Philosophie Anatomique* (1818) (Bergman, 2001).

In Britain, Erasmus Darwin (1731–1802), Charles Darwin's grandfather, published a theory of evolution in *Zoonomia* (1794–1796), and the concept of natural selection was developed by William Charles Wells in 1813 and later by Alfred Russell Wallace (Bergman, 2001).

Therefore, the ideas Darwin presented in *Origin of Species* were nothing new. Darwin's book was, however, highly successful in popularizing evolution by bringing it to the attention of educated people. Earlier theories of evolution apparently were not well received because at the time of their publication, the Bible and historic Christian doctrine still enjoyed a position of authority in the academy and society in general. But with the Enlightenment came autonomy, naturalism, materialism, scepticism, and liberalism, so when Charles Darwin published his ideas in 1859 the ground was fertile and the people receptive. Indeed, all 1250 copies in the first printing were sold immediately. Some copies were sent to known sympathizers, and the rest were sold to the trade, with orders for more (Desmond and Moore, 1994, see p. 477). Thus, the academy in particular was fertile ground for Darwin to push his ideas.

While theistic evolution theories are now frequently rejected by evangelical theologians and philosophers (Lane, 1994a, 1994b; Harbin, 1997; Moreland and Reynolds, 1999, pp. 219–248), this was not always the case. In fact, the church's response to Darwin appears to have been mixed. Charles Hodge (1874) of Princeton Seminary declared that Darwinism was tantamount to atheism. However, Hodge primarily objected to Darwinian evolution. He and many of his Princetonian colleagues were not totally opposed to theistic evolution. A. A. Hodge, A. H. Strong, R. A. Torrey, and B. B. Warfield also accepted the possibility of theistic evolution (Ramm, 1955, pp. 200–201). B. B. Warfield (1968) stated that evolution can supply "a theory of the method of the divine providence" (p. 238).

Scottish theologian James Orr (1960) felt that biological evolution was "extremely probable, and supported by a large body of evidence" (p. 99). Elsewhere, he wrote: "'Evolution,' in short, is coming to be recognized as but a new name for 'creation'" (Orr, 1972, p. 346).

George Frederick Wright (1838–1921), a teacher at Oberlin College who became editor of *Bibliotheca Sacra* in 1883, and Harvard botanist Asa Gray (1810–1888) were highly influential in convincing the North American Protestant community that Darwinism and Calvinism were quite compatible. Many who initially opposed Darwinism, such as James D. Dana, eventually accepted the idea even if in some modified form (Hannah, 1983).

Both Wright and Gray were theistic evolutionists who argued that developmentalism did not stand against Christianity, and that evolution provided proof for God's existence through design. Wright's pioneering labors, both in writing and in gaining a hearing for Gray among his fellow clergymen, were instrumental in causing Christianity and evolution to be viewed as being compatible (Hannah, 1983). James R. Moore (1979) wrote, "Christian Darwinism in America was as much the special creation of George Frederick Wright (1838–1921) as of Asa Gray…No two Christian men on either side of the Atlantic were more determined to advance the cause of Darwinism" (pp. 280, 283).

Twentieth Century to the Present

In regard to Creation and the age of the earth, evangelicals today generally hold to either "young-earth creation" or "old-earth progressive creation." Those who hold the young-earth view interpret the Genesis Creation account as plain, descriptive, historical narrative. Those who hold to old-earth progressive view, on the other hand, interpret the Genesis account in a couple of different ways. Advocates of the day-age view understand the Creation days to be long periods of time, in the order of millions of years. This idea is widely held by Christians who are also practicing scientists, as well as several notable theologians, including Buswell (1962), Stigers (1976), Kaiser (1992), Archer (1996), and Harris (1999).

The other major old-earth interpretation is the "literary framework view," which is now probably the most widely held view among theologians and commentators. This interpretation was first advocated by Arie Noordtzij from the University of Utrecht in *God's Word and the Testimony of the Ages* (1924). Noordtzij understood the days as merely an artistic or literary device; therefore they have no correspondence with actual, physical days. Major expositions of this view have been produced by Kline (1958, 1996), Blocher (1984), Mark E. Ross (1999), and Irons (2001).

Although the young-earth creationist position is now the minority view even among evangelicals, it still has a significant following and is held by a significant number of practicing scientists. In addition, the doctrinal statements of the Lutheran Church, Missouri Synod (*Brief Statement of Doctrinal Position*, Article 5) and the Wisconsin Evangelical Lutheran Synod (*Creed*, Article II.1–2) explicitly affirm creation in six days. Three Baptist bodies have confessions that affirm belief "in the Genesis account of creation," and one of them, the New Testament Association of Independent Baptist Churches, adds: "The six days of creation in Genesis Chapter One were solar, that is twenty-four hour days" (Lavallee, 1993).

Recent and current young-earth creationist theologians and commentators include Berkhof (*Systematic Theology*, 1930), Hepp (*Calvinism and the Philosophy of Nature*, 1930), Mueller (*Christian Dogmatics*, 1934), Leupold (*Exposition of Genesis*, 1942), Pieper (*Church Dogmatics*, 1950), Hoeksema (*Reformed Dogmatics*, 1966), Whitcomb (Whitcomb and Morris, 1961), Davis (*Paradise to Prison*, 1975), and Kelly (*Creation and Change*, 1997) (See Endnote 2).

Summary

Although Lewis (1989) noted that interpreters have never been of one mind, it is clear that the literal day view was, before the nineteenth century, the predominant view. This point is also acknowledged by Blocher (1984, see p. 36), Young (1987, see p. 4) and Youngblood (1991, see p. 41). Yet there appears to be a surprisingly strong resistance from numerous commentators to this obvious conclusion, including Ross (1994), Ross and Archer (2001, see pp. 68–70), and Forster and Marston (1999). Hall (1999b) lamented:

> The record of history is abundantly clear on this; yet, it is like extracting molars to convince some theologians to surrender an opinion that is in conflict with actual history. One has to question the tenacious resistance, especially when it is confronted with so much factual information. Why, I asked, would fine and godly theologians fight against history with so much energy when the case against it was so clear? The answer must provide interesting information about method. (p. 276.)

Lewis (1989) also noted that "the interpretation given has never been in isolation from the general approach to Scripture of the individual interpreter" (p. 455). Indeed, it appears that the acceptance of an ancient earth, the minimization of the impact of the Noahic flood, the rejection of the traditional reading of the Genesis account, and its reinterpretation to fit in with the new geology, were all the result of a general trend away from Scripture as the final authority in matters of history, and toward the acceptance of scientific investigation as the most reliable record of historical information and truth in general. This can be seen, for example, in the activities of the Geological Society of London founded in 1807. The society was dominated from the beginning by those who believed in an ancient earth, and the relationship of the Genesis account to geology was never discussed in its public communications (Mortenson, 1997), presumably because its members had little regard for its authority in matters relating to history and the natural world.

This same lack of respect for scriptural teaching appears to have also affected society in general. Livingston (1997), citing the work of Frank Miller Turner, pointed out that there was competition for cultural power in nineteenth-century English society between the old-fashioned clergyman and the new enthusiastic scientific professional. Thus, society was also witnessing a conflict between scientists and theologians. During the Victorian era cultural power progressively passed out of the hands of the elitist clergy and into the hands of the professional scientists who became the new elite. Consequently, when people encountered agricultural or medical or social problems, they progressively turned to science and scientists rather than to the church (Livingston, 1997).

Hannah (1983) summarized the whole situation nicely when talking about the change in attitudes of the New England clergy:

> The theory of creation changed categorically from 1856 to 1880 for [New England] clergymen, as did the place of the Genesis account in religious orthodoxy. While it was accepted in the 1840s as describing six consecutive twenty-four hour days of creation, by the 1850s it was viewed as explicative of origins but within a Day-Age mode. By the 1870s, however, the Genesis account was perceived as truth but not a delineation of central creation truth. Hopkins says of the Genesis account: "If this has any claim to credence, it cannot be a history of cosmogony. The creation which it designates must have been some other and some minor creation." Reinterpretation of traditional cosmology because of claimed advances in science makes it evident to the observer in the 20th century that uniformitarian and evolutionary science not only asserted its freedom

> from special divine revelation but triumphed over it in the hearts of many…[In the 19th century] science appeared to speak with the inerrancy that we accord to Scripture alone. It behooves us to remember to be cautious not to neglect the exegesis of Scripture and the qualitative gulf between special and general revelation. (pp. 57–58.)

Endnotes

1. Note by G. Howe, assistant editor: The "scriptural geologists," mentioned here (see Mortenson, 2004), deserve further comment. Mortenson (2004) was reviewed by Michael Oard (*CRSQ* 42:67) and by Don Ensign (*CRSQ* 42:68). The book introduces seven scientists from early nineteenth-century England who were defending the young-earth Creation and the global Flood views long before the twentieth-century resurgence of interest in creation science. Mortenson devoted a whole chapter to each of these workers: Granville Penn, George Bugg, Andrew Ute, George Fairholme, John Murray, George Young, and William Rhind. After being subjected to considerable opprobrium in their day, they have been largely ignored by both creationists and macroevolutionists. It is well to recognize that their significant contributions antedate the creationist writings of George M. Price by about 100 years and the founding of the Creation Research Society by over 120 years. Historians like Numbers (see Numbers, 1993) ought to redress this omission in their future writings.
2. Note by G. Howe, assistant editor: As Kulikovsky implies, these are but a representative few from the large group of creationist commentators and theologians. I would like to add the name of Stephen Boyd, physical scientist and theologian, whose important mathematical research supports the assertion that the days of Genesis were indented to be understood by the reader as real "solar" days. A non-technical summary of his studies is reported in chapter 11 of DeYoung, D. 2005. *Thousands…not Billions*. Master Books, Green Forest, AR, and a technical summary in chapter 9 of Vardiman, L., Snelling, A.A., and Chaffin, E.F. (editors). 2005. *Radioisotopes and the Age of the Earth*. Institute for Creation Research (Santee, CA), and the Creation Research Society (Chino Valley, AZ).

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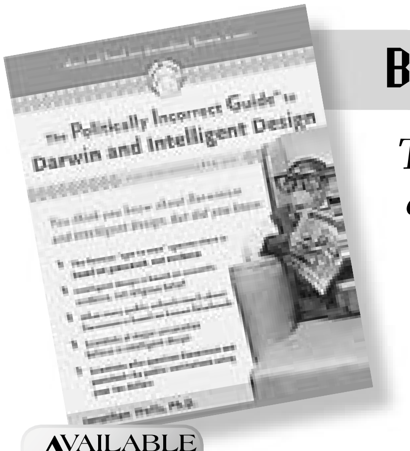

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Book Review

The Politically Incorrect Guide to Darwinism and Intelligent Design

by Jonathan Wells

Regnery Publishing, Washington, DC, 2006, 283 pages, $20.00.

This anti-Darwinian and pro-intelligent design book arguably is the most powerful contemporary and easily understandable text favoring these positions. Yet the work is scholarly with a respectable index and 47 pages of references and notes. Currently a battle is raging, and we are "in the midst of a major scientific revolution" (p. 207) which portends the collapse of Darwinism and the rise in the importance of Intelligent Design. From commencement to its conclusion, this book is a "revelatory experience" and should be on every library shelf.

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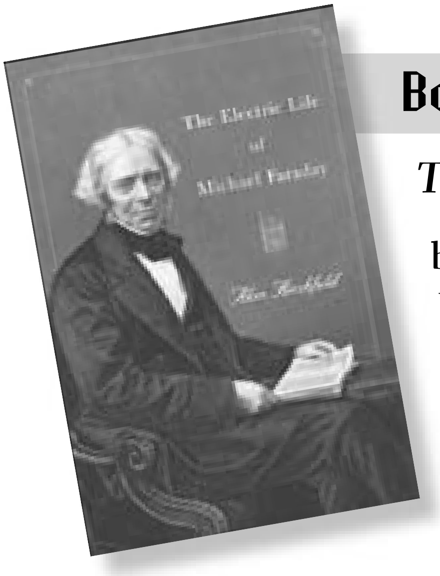

Book Review

The Electric Life of Michael Faraday

by Alan Hirshfeld

Walker and Company, New York, 2006, 258 pages, $24.00.

Physics professor and author Alan Hirshfeld tells the life story of Michael Faraday (1791–1867), one of the great experimentalists of all time. Michael was the son of a poor blacksmith and he faced an uphill battle against the social class structure of early England. His scientific ability was noticed and encouraged by his employer at a book bindery. While attending public lectures of the chemist Humphrey Davy at London's Royal Institution at age 21, Faraday took careful notes, bound them, and delivered them to Davy. This led to Faraday's apprenticeship with Davy. Faraday's education was elementary and non-mathematical, but he was gifted with deep insights in electricity and magnetism. A figure on p. 128 shows Faraday's first published drawing of magnetic lines of force. The similar pictures in modern physics texts have changed very little in 150 years.

Author Hirshfeld largely ignores the devout faith of Faraday. Michael belonged to a conservative Christian group called the Sandemanians. They were characterized by piety, humility, and community. The Sandemanians are mentioned in the book, but not Faraday's lifelong participation and allegiance to the group's conservative biblical worldview. Sarah Barnard, Faraday's wife for 46 years until his death, was a partner in faith. Faraday's friend JohnTyndall said that Faraday "drinks from the fount on Sunday which refreshes his soul for a week" (p. 6). The Faradays had no children, however Michael had a special fondness for youth and their education. He began a popular series of London Christmas lectures for children which continue today under Faraday's name. His early lectures were illustrated with items such as small electromagnetic rotators or motors which he built and demonstrated.

Around age 50, Michael Faraday experienced a nervous breakdown from which he never fully recovered. He described the afflication as being "weak in the head" (p. 150). Mental fatigue has afflicted many great minds including Isaac Newton and Ludwig Boltzmann. Nevertheless, Faraday continued with his experiments until his death at age 76. Along the way he coined such words as ion, electrode, anode, and cathode. The book brings out details of Faraday's personality: He enjoyed riding his bicycle down the hallways of the Royal Institution (p. 104). He romanced his wife-to-be Sarah, swam in the ocean, played ball, and climbed the Alpines in Switzerland (pp. 105, 161). Faraday also was an activist in stewardship of the creation, and championed the cleaning up of London's Thames River (p. 195).

The book concludes with a description of the close friendship between Michael Faraday and Clerk Maxwell, 40 years younger. Maxwell took Faraday's visual electric and magnetic ideas and provided the underlying mathematical details. Both men made great contributions to our understanding of creation, and both held firm biblical worldviews.

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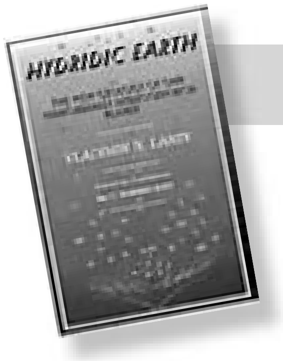

Book Review

Hydridic Earth

by Vladimir N. Larin

Polar Publishing, Calgary, Alberta T3G 5Y7 Canada, 2006, 256 pages, $23.00.

Hydridic Earth does what few books have attempted: it proposes a completely new model for the structure and dynamics of the inner earth. Larin is a Russian who has spent the majority of his scientific career developing this model and applying it to some of the thornier geological problems of our day. This book will be especially interesting to those looking for alternatives to the plate tectonics approach to geophysics and geology.

As the adherents of the plate tectonics models often point out, nobody seems to have an equally strong competing proposal. Although this is not a philosophical necessity to criticize plate tectonics, it is indeed difficult to fight something with nothing. Larin has provided a well-developed alternate view, albeit in a uniformitarian, old-earth context. However, the uniformitarian elements of Larin's theory appear to be much more peripheral than technical details. Creation scientists need to evaluate the validity of Larin's proposal in a young earth context.

Hydridic Earth is an expanding earth theory of the constant mass variety. Several geologists have given serious consideration to the expanding earth idea in times past. The single biggest obstacle has always been the lack of any theoretical mechanism that could possibly make the earth expand. Larin here provides a detailed physical and chemical mechanism, including some confirmation from laboratory studies.

The core (pun intended) of Larin's proposal is as follows: 1. A novel composition of the earth's inner mantle and core, primarily magnesium, silicon and much less iron, all compounded with a large amount of hydrogen (hence the book's title). Oxygen is confined to the surface and rocky upper mantle. 2. The hydrogen-metal compounds, at high heat and pressure, are capable of being compressed to as little as one seventh of the metal's normal volume, as protons actually penetrate the outer electron shell of the metallic atoms, thereby causing them to decrease in size. 3. Over time, the core de-gasses and transmits heat and mass toward the outer geospheres via a rapidly moving stream of proton gas. As it does so, the core expands back to a more normal volume. 4. Reaching the upper geospheres, the hydrogen ultimately compounds with carbon and oxygen, producing substantially all of the earth's water and hydrocarbon resources. 5. These streams of proton gas coalesce as they rise and combine with metals in the mantle below the asthenosphere, causing localized zones of contraction, as in point 2. Larin shows in detail how the unusual combination of heat and contraction, with subsequent de-gassing and re-expansion, is the driving force of a vertical tectonic process that causes orogeny and the creation of folded mountain belts. 6. Larin proposes a process for the expansion of ocean basins including the interesting detail that since the earth expansion requires great energy, supplied by the core as it degasses, therefore newly produced seabed would be relatively cold. 7. Larin applies his theory to a variety of problems in geology, including the causes of earthquakes, Wadati-Benioff zones, ore production, diapirism, and the creation of island arcs and deep-sea trenches.

Why should creation scientists care about an expanding earth theory proposed by a Russian old-earth adherent? Not only because it may be a serious alternative to plate tectonics, but because, ironically, it may at the same time provide a new theoretical basis for the Genesis Flood. A smaller earth, especially one with lower mountains, is much easier to cover with a global flood. Larin's geochemistry provides a specific source for large amounts of subterranean water (point 4). If the earth then grows in volume by the expansion of ocean basins, the water naturally recedes from the land into the new or enlarged seabeds. Larin expects his earth expansion to be episodic and relatively rapid, not a slow, age-long uniformitarian process, with rapid expulsion of underground water to the surface by the internal pressure of expansion. The application to the Genesis Flood and the fountains of the great deep is obvious.

This book is quite technical, as befits its subject, but is well written and translated. Unfortunately, it lacks an index. The book is not an easy read but is highly engrossing as Larin lucidly develops his theory and lays out his support.

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CRSQ
Creation Research Society Quarterly

Lack of Fossil Evidence for Arthropod Evolution Is a Major Difficulty for Neo-Darwinism

Jerry Bergman*

Abstract

The fossil record of the phylum Arthropoda is a major problem for neo-Darwinian evolutionism. No clear fossil evidence for arthropod evolution has ever been uncovered, even though millions of arthropod fossils have been found. The record as a whole clearly shows stasis or persistence of types, not progressive evolution from one order to another. A large proportion of all living and extinct animal species are members of the phylum Arthropoda, and the critical lack of fossil evidence for macroevolution of the entire phylum of Arthropoda favors creation.

Introduction

Arthropoda is the largest and most diverse phylum in the entire animal kingdom, comprising over one million different species (Giribet and Ribera, 2000). About 78% of all described extant animal species are arthropods (Wills, 2001), found in fresh water, marine, and terrestrial habitats worldwide (Wills et al., 1997). Arthropoda is not only the largest phylum in the animal kingdom, but it is also the only invertebrate phylum that contains aquatic, terrestrial, and aerial members. It includes the trilobites, crustaceans, arachnids, myriapods, horseshoe crabs (not covered in this article—see Helder, 1997), and hexapods (insects and three small orders of insect-like animals also not covered in this article—see Bergman, 2004, and Manning, 2003). They are so diverse that some entomologists have questioned whether or not they could have descended from a common ancestor, as is commonly taught (Manton, 1973). Lammerts (1974) concluded from his study of entomology that it

> was a source of constant wonder to me how such a remarkable array of creatures as are found in the order Coleoptera could ever be considered as having arisen from a common ancestor. One of my professors, Dr. E.C. VanDyke, a world authority on this group, often was equally puzzled. (p. 125.)

Arthropods are defined as "bilaterally symmetrical segmented animals with a characteristic tough chitinous protective exoskeleton flexible only at the joints; growth is by ecdysis" (Tootill, 1988). Ecdysis growth (often called *molting*) involves periodic shedding of the cuticle exoskeleton and growth of a new and larger exoskeleton. Each segment typically contains a pair of jointed appendages, modified so as to serve different functions. The coelom of an arthropod is a long fluid-filled cavity located between the gut wall and the body wall. The coelom in non-insect arthropods functions as a hydrostatic skeleton, and is reduced in size compared to the coelom of insects. The main arthropod body cavity is a blood-filled coelom, a structure known as the haemocoel. They also have a ventral nerve cord, a pair of cerebral ganglia, and paired segmental ganglia (Tootill, 1988). Arthropods are also the "only invertebrates that show a definite, individualized form of adipose tissue" (Kaufmann, 1977, p. 214).

The Arthropod Fossil Record in General

Darwin saw the fossil record as a major problem with his theory and expected that time would fill the now-famous

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Accepted for publication: December 16, 2005

"missing links." Most of the fossil evidence used in an attempt to support neo-Darwinism consists of vertebrate bone fragments that require much interpretation and this has led to much controversy among vertebrate paleontologists. Of the estimated 1.7 million known species of animals, fully 95% are invertebrates, and most of these are arthropods (Barnes, 1987). An enormous fossil record exists for many invertebrates, including arthropods—easily in the millions. Many of these arthropod fossils show excellent external morphology (Eldredge, 2000). Furthermore, "some of the earliest, most conspicuous and informative metazoan fossils are ... arthropods" (Wills, 2001, p. 187), which are found in greater profusion in the rocks labeled *Paleozoic*, *Mesozoic*, and *Cenozoic* than any other group of organisms. Even plant arthropod interactions have been documented as far back as the postulated Paleozoic Era (Chaloner et al., 1991).

While major problems exist with the vast time periods ascribed to these supposed geologic ages, they will be used throughout this paper as a frame of reference. Arthropod larvae that are less than one millimeter long have been found in late Cambrian rocks (Anderson, 1998, p. 434). A rich arthropod fossil record has been found in such excellent preservatives as amber, tar, or ice that often shows exquisite detail of even minute body structures such as eyes and hair (Gayrard-Valy, 1994; Alonso et al., 2000). Another reason for the rich fossil record is that certain arthropods, including trilobites, malacostrancans, and ostracods, have skeletons reinforced with calcium carbonate (Wills, 2001).

The fossil record of terrestrial arthropods goes back to before the Early Devonian in the evolutionary time scheme (Edgecombe, 1998a, p. 174). This excellent fossil record allows accurate comparisons of ancient and modern arthropod forms that can be used to evaluate Darwinism. For an example see Delclos et al, 2000. Budd (1997) concluded that "what these fossils mean, however, both in terms of arthropod classification and the early evolution of the phylum is far from clear: no single opinion has won universal assent" because the fossil record shows no clear evidence of macroevolution (p. 125).

Trackways left by trace-forming animals and arthropod borings are also common and important in the fossil record, especially for non-marine arthropods (Donovan, 1994, p. 200). Furthermore, ancient or fossil spider webs as well as wasp, bee, and ant nests all have been discovered.

A major problem in determining evolutionary relationships of the phylum Arthropoda is the lack of a consensus on what exactly defines a phylum or other taxonomic rank (Meglitsch and Schram, 1991). An even greater problem is determining if those creatures now classified as arthropods actually belong to the single phylum Arthropoda (Anderson, 1998). Disagreements exist about even such basic information as the adequacy of the fossil record to determine phylogeny. For example:

> The fossil record of the Crustacea is often stated in textbooks to be poor, but the truth is that the record is good. All four classes of crustaceans have fossils.... The record is so extensive, in fact, that limitations of space do not allow much discussion. (Meglitsch and Schram, 1991, p. 490.)

Although an "abundance" of fascinating fossil arthropods is known (Meglitsch and Schram, 1991, p. 368), the record provides little evidence for either their origin or development by macroevolution. As a result a "mind-boggling array of hypotheses and scenarios" exists for

> "arthropod evolution. Every authority seems to have his own version. There is not even agreement as to whether there is one phylum, Arthropoda" (Meglitsch and Schram, 1991, p. 369).

A significant problem for Darwinism is the fact that some of the oldest forms of animal life that are found in the fossil record are also some of the most complex (Eldredge, 2000, p. 42). Little disagreement exists about the facts concerning fossil arthropods, but there is considerable disagreement about the implications of those facts (Morris, 2000: Hallam, 1977).

Aguinaldo et al., (1997) concluded that the

> arthropods constitute the most diverse animal group, but, despite their rich fossil record and a century of study, their phylogenetic relationships remain unclear. Taxa previously proposed to be sister groups to the arthropods include Annelida, Onychophora, Tardigrada and others, but hypotheses of phylogenetic relationships have been conflicting. (p. 489.)

So many fossils have been found that some paleontologists believe the "early terrestrial ecosystems were dominated by small arthropods" (Shear et al., 1996, p. 555). In spite of the "excellent preservation, there are many conspicuous gaps in the arthropod record" and, as a result, "enormous controversy has surrounded the relationships of the major groups" (Wills, 2001, pp. 188, 190). For several suggested phylogenetic relationships among arthropods, see Valentine (1989) and Edgecombe (1998a).

The Trilobita

The trilobites are extremely abundant in strata assigned to both the Cambrian and Silurian (see Figures 1 and 3 for examples). About 65 different genera and over 100 species have been named so far (Margulis and Sagan, 2002, see p. 180). Trilobites have a flat, oval body divided longitudinally into three lobes—hence their name. In common with other arthropods, they have a head, a thorax, and an abdomen. Like dogs, they display a great deal of variety, yet the trilobites all possess three lobes and a chitinous

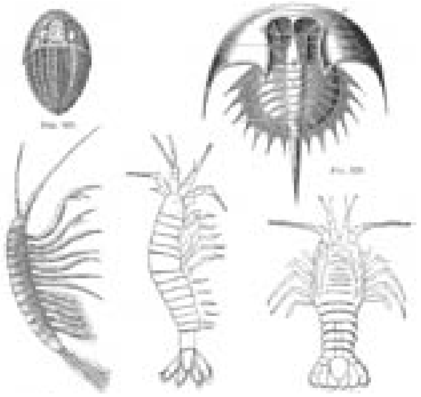

Figure 1. Examples of trilobites illustrating the enormous variety found. (From Le Conte, 1908, pp. 311 & 334.)

exoskeleton (Sherwin and Armitage, 2003). Trilobites are easy to identify because many of their traits, such as their overall plan of limb organization, are unique to Trilobita when compared to other arthropod groups (Eldredge, 1977, see p. 327).

Trilobites have been preserved extremely well (see Figure 2), partly because their hard calcium-carbonate carapace (body covering) is highly resistant to deterioration (Margulis and Sagan, 2002). For this reason, their fossil record is one of the best of any plant or animal. They can be found in "trilobite beds" located many places (Meister, 1968). For this reason they are by far one of the most carefully studied of all the invertebrate groups (Clarkson, 1986). Trilobites are "commonly preserved as chitinous plates" or as molds and, in some cases, their "actual integument is so well preserved that the markings on the surface can still be seen" (Twenhofel and Shrock, 1935, p. 433).

Their eyes, especially, have been studied extensively, as have their numerous paired appendages. Fortunately, trilobites have been preserved in the fossil record in enormous detail (see Levi-Setti, 1993, see pp. 45–54 for SEM photographs that show this detail). Trilobites' eyes consisted of huge, complex, compound-faceted structures that sometimes formed a continuous band across their whole frontal margin (Prokop, 1995). The trilobite eyes resemble eyes of modern insects, and were probably at least as complex. Design features such as these strongly support the handiwork of an intelligent Creator (Sherwin and Armitage, 2003; DeYoung, 2002).

Trilobites are important both to the neo-Darwinian and Creation position (Cook, 1968). Eldredge (2000) claims that the Trilobita "are as compelling examples of evolution as any of which I am aware," yet they show only microevolution (p. 122). Millions have been found in excellent condition, which allow an accurate reconstruction of their history but shows no support for macroevolution. Instead, the fossil record shows a "relatively sudden, abrupt appearance

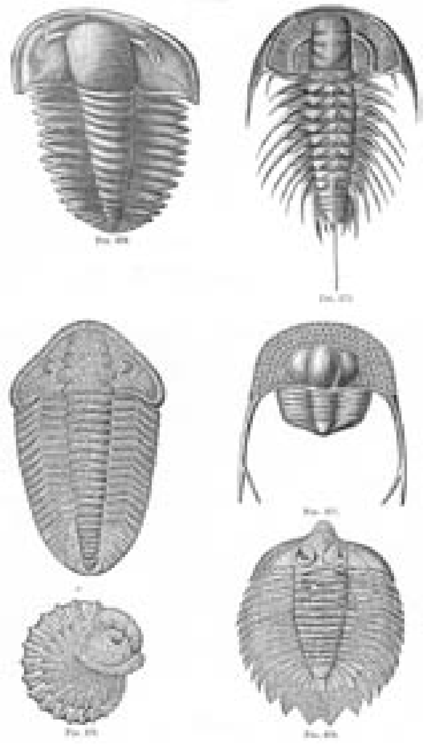

Figure 3. Some examples of Carboniferous Crustaceans illustrating the enormous variety found. (From Le Conte, 1908, p. 411.)

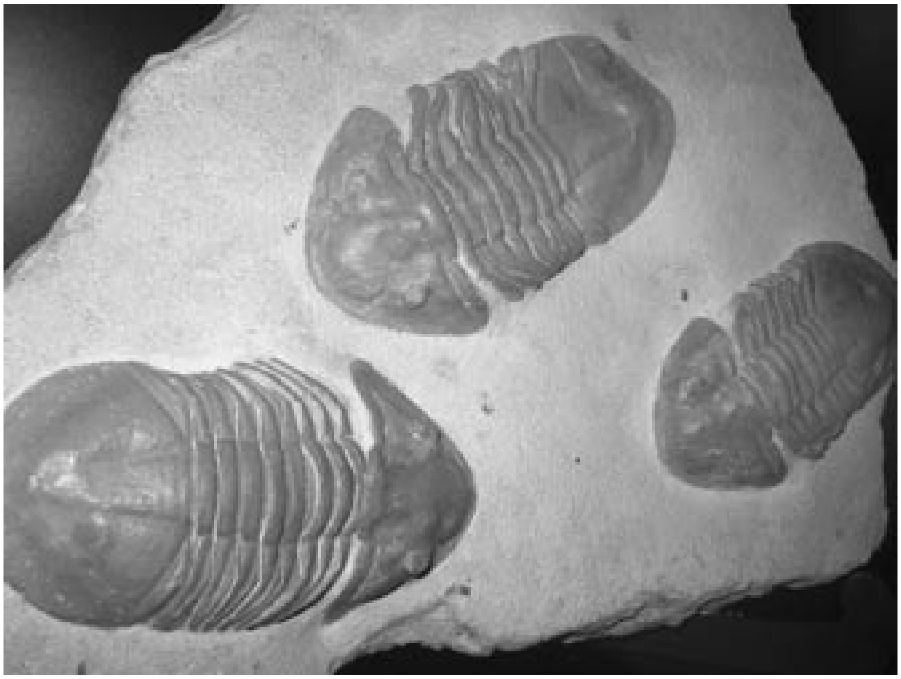

Figure 2. A photograph of a section of how trilobites are found, indicating mass burial. Photograph courtesy of the Big Valley Creation Science Museum, Alberta, Canada.

of trilobites and other complex forms of animal life at the base of the Cambrian" (Eldredge, 1977, p. 44). As Clarkson (1986) noted, "almost nothing is known about the ancestors of the trilobites. In common with other arthropods it may be presumed that trilobites were possibly derived from the same ancestors as the annelids ... but this is only speculation" (p. 330). Many researchers argue that trilobites are most closely related to crustaceans. Most trilobite types existed contemporaneously with each other, which precludes hypothesizing any clear evolutionary trends within existing fossils.

Extensive study of their fossils has demonstrated that trilobite "species and subspecies tend to remain relatively unchanged ... throughout their stratigraphic ranges" and that there are "fewer long-term 'evolutionary trends' within lineages 'documented' for trilobites than for many other groups" (Eldredge, 1977, pp. 309, 316). Some devolution, though, such as loss of eyes, is seen in the fossil record (Whittington, 1992).

The fossil record does not provide evidence of relatively rapid evolution followed by stasis and then more evolution. Instead, it shows "the *abrupt appearance* of different kinds of trilobites in the Lower Cambrian, and the replacement of these early groups by new ones during the transition from Cambrian to Ordovician" (Whittington, 1992, p. 84, emphasis added). Furthermore, "no evidence, such as a transition series of fossils," has been found to bridge the gulfs separating the various species of trilobites from each other (Whittington, 1992, p. 85, and also see chart, p. 86). Lack of intermediate forms is consistent with a creation origins model.

Wholesale speculation about trilobite evolution by paleontologists is the norm, causing Whittington to state that there "is no lack of either interpretation or speculation" (1992, p. 85). Eldredge (2000) tried to account for the lack of fossil evidence for trilobite evolution by resorting to the punctuated equilibrium model—the theory that evolution proceeded for relatively short periods of time followed by long periods of stasis (see p. 44). Eldredge and Gould actually developed their punctuated equilibrium theory specifically to explain the lack of fossil record for trilobite evolution (Eldredge, 1977, 2000; Gould, 1977).

Large numbers of trilobites died off at the end of the Cambrian for unknown reasons, and the fossil record indicates that a burst of new kinds appeared in rock formations assigned to the next period, the Ordovician. But "after this great burst of new constructional themes in the early Ordovician very few entirely new patterns of organization arose ... trilobites as a whole remained constructed on the same archetypal plan defined in the earliest Cambrian" (Clarkson, 1986, p. 331). All trilobites became extinct, as evidently did many other animals, in what evolutionists call the great Permian extinction.

The Crustaceans

The subphyla Crustacea contains over 35,000 species located worldwide, primarily in freshwater and marine habitats. For some examples see Figure 3. Crustaceans have the highest diversity of body plans of all arthropoda, and include shrimp, crabs, lobsters, barnacles, wood lice, water fleas such as Daphnia, and copepods (Giribet and Ribera, 2000, p. 220). They have five pairs of locomotion appendages, the first two of which may be pincers for defense or manipulation of food. They also have complex, well-developed eyes (Hamilton, 1986). The oldest crustacean fossils date all the way back to the early Cambrian times. Anderson notes that, although the

> fossil record is quite abundant for many crustacean groups, it provides no clear evidence on the origin of the Crustacea, and there has been considerable debate regarding the primitive or ancestral body form of the first crustaceans. Current opinion favours a long body with many similar trunk segments, two pairs of biramous [arthropod appendages that have two branches] antennae and a nauplius [a larva stage characterized by three appendages] larva, but is divided on whether the trunk bore biramous or polyramous [arthropod appendages that have more than two branches] swimming appendages (1998, p. 316, brackets added).

Other researchers disagree and argue that the Crustacea evolved from a type of spiralian or proto-platyhelminthes worm (Willmer, 1990, see pp. 298–299). The phylogenetic relationship of the crustaceans is complicated, and little consensus exists (Giribet and Ribera, 2000, see p. 220).

Arachnida (Chelicerates)

Arachnids (spiders, scorpions, solifuges, mites, and ticks) have four pairs of walking appendages. Spiders are an arachnid group that ranks seventh in number among all animal species so far described and estimated. Between 30,000 and 40,000 species of spiders are found worldwide, from Arctic regions to deserts (Williams and Goette, 1997, see pp. 3–4). One of the most infamous spiders is the tarantula, a large "hairy" spider, famous in horror films but actually it is a shy creature whose bites are relatively harmless (Williams and Goette, 1997). Of the tarantula, Foelix, (1982, see pp. 45–46) writes that its bite is hardly worse than a wasp sting.

The "earliest" known spiders had a "nearly complete spinneret whose structure is quite advanced" (Preston-Mafham, 1991, see p. 13). The tough exoskeleton of many Arachnids aids in both preservation and identification. Many spiders have been extremely well preserved in the fossil record (in amber and elsewhere), and are readily identifiable. Amber has preserved even those arthropods that lack tough exoskeletons. Fossil spiders have been identified from close to 60 different families in one amber type alone, dating back to the Tertiary, and some date as far back as the Upper Cretaceous or earlier (Penney, 2001, 2002; Schawaller, 1983; Poinar, 2000).

Over 200 spider species have been identified in Miocene amber from the Dominican Republic alone (Penney, 2001). Many of the fossils in amber that "date from as long as 55 million years ago belong to genera which are still in existence today" (Preston-Mafham, 1996, p. 9). Those arachnida in amber appear very modern in all respects, and even include fully developed web threads (Poinar and Poinar, 1999). Fully modern-looking scorpions also have been found in amber (Poinar and Poinar, 1999, see pp. 76–78). Leeming concluded that scorpions have existed relatively unchanged since they first appeared in the fossil record—an estimated 450 million years ago (2004).

Recent fossil discoveries date modern forms of arachnids back to about 414 million years, "forcing scientists to revise their thoughts about ... one of the most important steps in evolutionary history" (Monastersky, 2003, p. 292). The existing examples preserved in amber support the conclusion that no evidence for macroevolution exists (Shultz, 1994). A common view is that arachnids evolved from some king crab type of animal. As Preston-Mafham admits, however, "we can only guess at what the ancestors of spiders and scorpions might have looked like [although] we as of yet have no definite proof, it is believed that all of the arachnids arose from a common ancestor" (Preston-Mafham, 1991, pp. 12, 15). An absence of ancestral links also applies to scorpions and other arachnids (Poinar et al., 1998; Fortey and Thomas, 1997).

The evolution of arachnid accessory organs also must be accounted for by neo-Darwinism. For example, the evolution of the spider silk glands and spinnerets necessary for making webs are explained by assuming that 180 million years ago spider silk was simply "excretory material deposited behind as the spider ran about it" (Kaston, 1966, p. 27). From this stage the silk evolved into a dragline, next into a trip wire, and finally it formed a spider web. Problems with this idea include explaining how the spider survived until the spinneret was fully evolved, and the fact that the spinneret silk producing organ is irreducibly complex and separate from the anus.

Another theory of spider-web evolution is that ancestral spiders used alpha keratin (a component of spider threads) to cover their eggs (Vollrath, 1992). Once the silk glands evolved, the brain program to produce a web must have also evolved—the silk is useless to capture food until the spider has the mental ability to make a web (Williams, 1992, see p. 88–89). Furthermore, "'primitive' webs are not necessarily structurally simpler or less complex than 'advanced' webs" (Williams, 1988, p. 123).

Spider silk is produced in silk glands that open from spigots located on the spinnerets (Donovan, 1994). Many varieties of silk exist—the female garden-cross spider alone can produce at least seven different kinds of silk (Vollrath, 1992). The silk is proteinaceous and can be preserved well in the fossil record—threads of spider silk date back to mid-Tertiary, and one spider web dates from the Eocene (Codington, 1992). The fossil record traces spinnerets all the way back to the Devonian and Carboniferous (Donovan, 1994). The evidence indicates the earliest known silk and spinnerets were fully modern, and no evidence exists of spinneret evolution—the theory that they evolved from a pair of legs finds no evidence in the fossil record (Vollrath, 1992, see p. 72).

Myriapoda

The subphyla Myriapoda includes centipedes and millipedes. Evidence of myriapods exists all the way back to the Cambrian (Budd, 2001; Kraus and Kraus, 1994). These animals have many pairs of walking legs, with either one or two pairs per body segment (Williams et al., 1991). Millipedes are preserved in amber, and even in rock, as a result of such events as calcite coating, lining, and the impregnation of their chitinous exoskeleton. Even "delicate structures such as limbs, antennae, gonopods, and eyes" all have been beautifully preserved (Donovan and Veltkamp, 1994, p. 355). Excellently preserved Lower Devonian fossils that reveal fine detail of the exoskeleton have been found in regions isolated from the major landmasses, such as Australia (Edgecombe, 1998a, see pp. 172–174). These fossils reveal only evidence of variation within the spider baramin, not evolution; many are identical to Myriapoda existing today. For this reason, the Myriapoda is one of the most problematic groups in which to use morphology as a basis for producing phylogenetic trees (Giribet and Ribera, 2000).

Genetic Comparisons

Problems in using the fossil record to trace the origin of arthropods are so serious that some researchers have tried to ignore the fossils entirely and have chosen to produce evolutionary trees by using other means, such as DNA sequence data. Because these DNA data often are contradictory, others, such as Meglitsch and Schram (1991) ignored both biochemical and DNA data in developing their evolutionary trees. They relied only on the morphology of living animals. It is difficult at this early stage to draw anything but tentative conclusions about the usefulness of genetic comparisons in constructing phylogenies, because only a small percentage of arthropods have been examined. Also, we now realize that we do not know as much as we thought we did a few years ago about how nucleic acids affect final phenotypes.

Existing biochemical comparisons have not been very encouraging for neo-Darwinists. For example, Burmester (2002) noted that hemocyanin evolution is strikingly different in each of three arthropoda groups: the Chelicerata, the Myriapoda and the Crustacea. One solution is to place the origin of phyla earlier and hypothesize periods of "speeded-up" molecular evolution (Vermeij, 1996, p. 525). But this solution creates other discrepancies and problems with the fossil record (Schram, and Koenemann, 2001).

The rRNA is believed to be the most useful nucleotide for studying Metazoan evolution (Valentine et al., 1996). In a study of ribosomal DNA sequences, Giribet and Ribera (2000) found a high level of sequence heterogeneity in the 18s rRNA gene, making it so difficult to do phylogenetic comparisons that some workers feel this is approach of little or no value. Differences between the data from molecular biology, paleontology, and neontology [the retention of juvenile features in the adult stage of development] have produced what Giribet and Ribera (2000) describe as furious debates (see p. 204). They actually conclude that ribosomal DNA sequence data by themselves "may not contain enough information to give a satisfactory explanation for the large and complicated evolutionary history of arthropods" (p. 225).

Discussion

The whole arthropod fossil record shows what Eldredge found was true of trilobites: that "stability was the norm," although "small" changes (microevolution) occasionally do appear (Eldredge, 2000, p. 84). Eldredge also stated that a century of the study of fossils by paleontologists has consistently found "the persistence of stable species for millions of years" (Eldredge, 2000, p. 85). After noting that "paleontology has to date contributed almost nothing to evolutionary theory," Eldredge (1977, p. 306) proposed several reasons why this is true and the main reason was "[evolution] typically happens so quickly that rarely do we catch it in midstream when we scour the fossil record for insights on how evolution occurs" (2000, p. 85). This conclusion is based only upon speculation and is why Gould (1977) concluded that "the basic questions paleontologists have asked about the history of life" have "found no resolution within the Darwinian paradigm" (p. 1).

The practice of overcoming fossil-record problems by using other criteria produces cladograms based solely on comparisons of morphological traits. It totally ignores both biochemical data and the fossil record, neither of which provide evidence for neo-Darwinism. As Willmer (1990, p. 75) concluded, despite our best efforts we have "not achieved very much understanding" of invertebrate evolution from our study of the fossil record. New conclusions overturning existing firmly established ideas are common in the field (Cowen, 2003; Doyle, 1996).

Even modern symbiotic relationships have been shown to exist in the fossil record of some arthropods. Phoresy is a symbiotic relationship, especially among arthropods and some fishes, in which one organism transports another organism of a different species. Poinar et al. (1998) found that between pseudoscorpions and a many arthropods phoresy is of long standing and is obligatory in many cases as "demonstrated by its continuance for millions of years, as shown by the fossil record" (p. 78).

Conclusions

If evolution had occurred, clear evidence would be abundant to support it in the enormously large arthropod fossil record. This review has confirmed invertebrate zoologist Robert Barnes's (1980) observation that "the fossil record tells us almost nothing about the evolutionary origin of phyla and classes. Intermediate forms are non-existant" (p. 365). Barnes (1980) also noted that the only exception to this generalization was an animal "which may be on the line leading to the cephalopods" (p. 365). He added, optimistically, that the needed intermediate forms exist, but are now undiscovered or not recognized and more work will reveal them (Barnes, 1980).

Over two decades later Barnes's conclusion is still true: the needed forms have not been found. What the fossil record shows is that the number of marine invertebrate species has been fairly constant for most of the last 600 million years of evolutionary "time" (Raup, 1976, 1991; Raup and Boyajian, 1988). One problem is that the proposed lineages were based on charts produced from assumptions based on evolutionary theory, and the charts were then in turn used as evidence of the theory used to produce them, which is circular reasoning (Easton, 1960, see p. 34).

Although the fossil record "should be the final arbiter in deciding between opposing theories on major issues of phylogeny" (Willmer, 1990, p. 52), the fossil record is ignored, and whatever method seems to work is selected to support the theory of common descent. Thomas (2003) admitted that arthropods rule the world, at least among multicellular animals, and that

> we'd like to think that we understand the basic outlines of their evolutionary relationships. Unfortunately, we don't. The last time experts on all branches of arthropods came together to discuss their phylogeny, back in 1996, consensus was conspicuously absent. Since then, it is safe to say, virtually everyone accepts that the arthropods are a monophyletic group—that is, their last common ancestor was something we would recognize as an arthropod. Beyond that rather modest point, argument still rages about many of the evolutionary relationships within

> and between the four major extant arthropod groups.... One of the few points of general agreement has been that the hexapods are monophyletic, that is, they arose just once from a single common six-legged ancestor. (p. 1854.)

Thomas concluded that even this consensus concerning six-legged creatures has now been shattered by DNA research (see Nardi et al., 2003) and this revolution has affected all invertebrates (Ruppert et al., 2004). Further work has made the Darwinistic worldview even more tenuous. As Valentine (1989) concluded, "speculations as to the evolutionary relationships among living animal phyla began shortly after Darwin's seminal publications and have continued to the present time" (p. 2272). This is true even though the fossil record today "extends back more than a hundred million years earlier than that known in Darwin's time" (Valentine, 1989, p. 2272). The current situation, as summarized by Aguinaldo (1997), agrees with my review:

> The arthropods constitute the most diverse animal group, but, despite their rich fossil record and a century of study, their phylogenetic relationships remain unclear. Taxa previously proposed to be sister groups to the arthropods include Annelida, Onychophora, Tardigrada and others, but hypotheses of phylogenetic relationships have been conflicting (p. 489).

A cladogram is a branching diagram of different life forms placed in a diagram according to comparisons of selected characteristics assumed to have been derived from a common ancestor. In a study of 179 published cladograms, Wills (2001) concluded that "on several measures, cladograms of arthropods show lower congruence with the fossil record than a large sample of cladograms of various other taxa" (p. 201). The gaps in the fossil record are often given as the reason for this low congruence. Yet arthropod fossils that are most durable, such as trilobites, show among the lowest indices of congruence, "and for some trees almost any random range reassignment or random tree topology yields higher congruence" (Wills, 2001, p. 206; see also Weygoldt, 1996). In other words, selection of different traits to make comparisons produces different cladograms.

All of these problems support the belief that many arthropod baramins were separately created. Macroevolutionism is again shown to be inferior to the concept of special creation.

Acknowledgments

I wish to thank Wayne Frair Ph.D., Bert Thompson Ph.D., Clifford Lillo M.A., George Howe Ph.D., John Woodmorappe M.A., and Jody Allen for their comments on an earlier draft of this paper. I also thank Emmett L. Williams Ph.D., for helping me locate earlier papers on the creation view of arthropod origins and an anonymous referee for several helpful suggestions.

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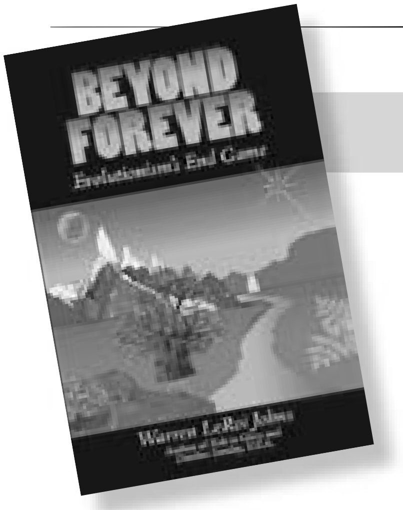


Book Review

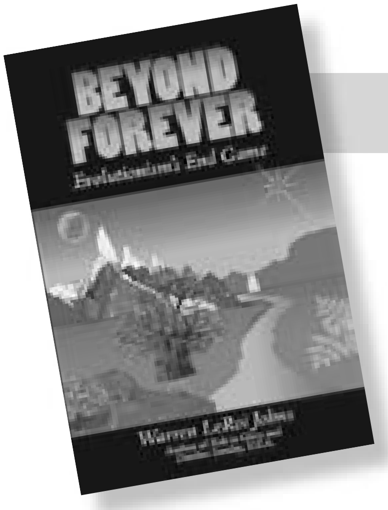
Beyond Forever: Evolutionism's End Game

by Warren LeRoi Johns

www.CreationDigest.com, 2007, 360 pages, $25.95.

This book by Johns is loaded with information concerning all aspects of the creation/evolution controversy. The chapter titles include Evo's Dark Secrets, Extrapolated Mythology, The Gene Machine, Information, The Mouse that Laughed, Irreducible Complexity, Forty Million Mistakes, Debunking Common Ancestry, Numbers Game, Dating Planet Earth, Teaching the Controversy, Academic Freedom, and Empowering Reason: A Fresh Look at Old Ideas. Each chapter is thoroughly referenced and the bibliography includes almost 500 titles. The writing style is very readable. I highly recommend this book to both scientists and non-scientists.

Duane T. Gish, Ph.D.
Senior Vice President Emeritus
Institute for Creation Research



Book Review

Beyond Forever: Evolutionism's End Game

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"Streams flow downhill, feeding rivers that merge with oceans. No voice argues that flowing water defies gravity, reverses its natural course, and flows uphill. Change in the natural world is obvious - water moves, the earth rotates shifting its position, tides rise and fall and radically different sizes and shapes of dog breeds descend from a common gene pool" (pp. 14–15). These are not the kind of changes conjectured by evolution theory. "Genomic versatility assures diversified breeds, sub-species and species. The change moves descendants either laterally or downstream from a given ancestor kind - never upstream against the genetic current to an entirely different order, class or phylum as envisioned by Darwin's 'tree of life'" (p. 15).

"Natural selection works for survivability of the genome, overriding or avoiding hazards rather than launching a life kind on the road to some entirely new creature. Built-in genetic flexibility, protective of survival, is 180° the opposite from evolutionism's theoretical, transitional step toward offspring destined to ultimately supersede the parent generation" (p. 13). The previous quotations anchor the theme of the book's first chapter, "Evo's Dark Secret: Extrapolated Mythology." The author highlights the reality of genetic reserves inherent in every life kind that produce differently shaped finch beaks and moths displaying different shades of white and gray. But this change within a genome cannot be extrapolated to prove macroscopic evolution. Finches remain finches, moths flutter on as moths, and mutated fruit flies produce only thousands of descendant fruit fly generations.

With comprehensive coverage, the book targets the classic issues exposing the Darwinian shortfall with its unproven assumptions, conjectured origin of first life, genetic information requiring an intelligent source, complex cellular structure and function, discontinuity in the fossil record rather than the chain of organic life predicted by Darwin, and earth's age. Finally, "Irreducible Complexity is the 'joker' in evolutionism's card deck!" (p. 113). But more than a treatise examining evolution's shortfall, Johns dips into history, exploring the evolution of evolution itself since the initial publication of Darwin's conjectures. This includes the negative impact of evolution on social and cultural fabrics, the political fallout from "teaching the controversy" in the public schools, and a lawyer's look at the court system's handling of the issue beginning with the 1925 Scopes trial. (Incidentally, several years ago, Johns interviewed and videotaped three eyewitnesses to the Scopes event).

Author Warren LeRoi Johns is a lawyer (doctorate in jurisprudence, University of Southern California) and is professionally trained to evaluate evidence in his search for the whole truth. In 1999 he published a novel, *Ride to Glory*, aimed at exposing shortfalls in evolutionary thinking. Since 2000 he has been writing and editing material for the website www.CreationDigest.com. His personal Christian and biblical Creation views are presented clearly in Chapter 20, the final chapter of *Beyond Forever*. Johns states that the Genesis account of the Universal Flood and the Creation Week composed of literal 24-hour days has been authenticated by the words of Christ and endorsed by the Apostle Paul.

I found *Beyond Forever* to be clear and easy reading, sometimes even casual, with a free flowing style. Both creation and evolution literature are quoted liberally and referenced. The book includes an introduction, 20 chapters, acknowledgements, resources, 37 pages of endnotes, and a 10-page bibliography.

Will the reading of Johns' book convince an evolutionist to change his view to accepting Intelligent Design and biblical Creation as valid alternatives? Hopefully, yes! This of course depends upon personal objectivity; but minimally, *Beyond Forever* will challenge readers to probe more deeply into origins issues.

In the final chapter, Johns defines his personal faith and the reason for the title of his book, *Beyond Forever.* He affirms the biblical teaching that Jesus Christ is the Creator of all living things, is alive today, and should be preeminent in our lives. As we serve Him we may look forward to future glory. Johns closes his book by presenting the reader with the perspective that "…deep time stretches in all directions - out of sight into the misty past and beyond forever into the future" (p. 302).

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Polystrate Fossils Require Rapid Deposition

Michael J. Oard* and Hank Giesecke

Abstract

Polystrate fossils are one of numerous evidences for the rapid deposition of strata, as opposed to the uniformitarian belief in slow deposition over millions of years. They are briefly described from the Joggins Formation, Nova Scotia; Yellowstone National Park, Montana and Wyoming; Ginkgo Petrified Forest State Park, Washington; the Geodetic Hills of Axel Heiberg Island; the Lompoc diatomite, California; and a diatomite from Peru. Uniformitarian geologists usually ignore polystrate fossils or claim that they represent only local rapid deposition, but they rarely supply any supporting evidence. A new location with polystrate petrified trees is described from open-pit coal mines in Alaska. About twenty upright trees at many different levels support rapid deposition of the strata there. The upright trees can be explained by the creationist log mat model, and evidence from the coal mines supports that interpretation.

Introduction

Uniformitarian scientists believe that most strata were laid down very slowly over hundreds of thousands to millions of years. The rate of deposition may have been on the order of 1 cm per thousand years. Creationists, on the other hand, believe that most strata were laid down very rapidly in the one-year Genesis Flood.

Polystrate fossils demonstrate rapid deposition. Polystrate fossils are fossils that span more than one layer of strata (Rupke, 1970; Morris, 1974; Coffin, 1975; 1983) as indicated by their name; "poly" means many. Most are petrified trees that are perpendicular to the bedding. Polystrate trees commonly are just as well preserved at the top as at the bottom, indicating that the whole tree was rapidly sealed from decay or organism consumption before petrification (Rupke, 1970).

Several locations that display polystrate fossils will be described. The uniformitarian response to polystrate fossils will be analyzed. A study of polystrate fossil trees from open-pit coal mines in Alaska also will be presented as evidence of the weakness of uniformitarian explanations. The article will end by showing that polystrate fossils, as well as coal, can be explained by the log mat model.

Examples of Polystrate Fossils

Polystrate trees were discovered long ago in the coal measures of England and Wales (Ager, 1993). They were found up to 10 m in height in the Lancashire coalfield of northwest England. Ager noted that polystrate trees are known from many parts of the world.

The famous Joggins Formation of Nova Scotia, considered Early Pennsylvanian within the uniformitarian geological column, displays abundant polystrate trees and casts of trees (Coffin, 1975; Morris, 1999; Juby, 2006). At least 76 coal seams ranging in thickness from 0.05 to 1.5 m and 63 "forested" horizons (defined by the levels where vertical trees are found) with vertical lycopsid trees 5 to 6 m tall are known (Waldron and Rygel, 2005). Figure 1 shows one of the trees from the Joggins Formation. One lycopsid cast is as tall as 12 m. Most

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Accepted for publication: November 6, 2006

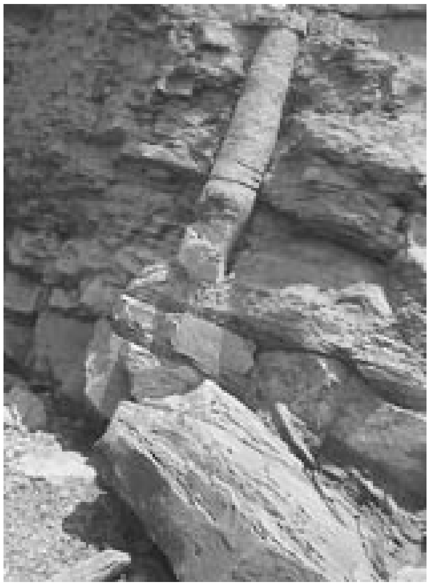

Figure 1. Polystrate tree several meters tall from Joggins Formation, Nova Scotia. Photo courtesy of Ian Juby.

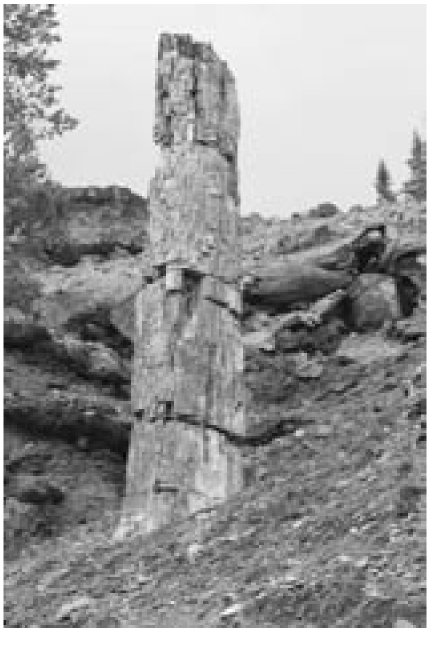

Figure 2. Four-meter tall petrified tree vertical to layers of volcanic breccia at Specimen Creek, Yellowstone National Park. Photo by David Oard.

of these "forested" horizons are associated with thin organic-rich horizons or mineral soils. Uniformitarian scientists simply assume that these vertical trees grew on the spot. Of course, if this were true, 63 forests must have grown over a long period of time, providing a showcase for uniformitarian long ages.

In fact, the Joggins trees are considered a showcase. The Joggins cliffs are even in the process of becoming a World Heritage Site (Falcon-Lang and Calder, 2004). Charles Lyell considered the Joggins polystrate fossils as the most important verification of uniformitarianism.

> Hailed in 1842 by Charles Lyell (1881, pp. 64–65) as "the most wonderful phenomenon perhaps that I have ever seen," Joggins is mentioned in his *Principles of Geology* (Lyell, 1872) and Darwin's (1859) *On the Origin of Species*. This remarkable section, proposed as a UNESCO World Heritage Site (Falcon-Lang and Calder, 2004), profoundly influenced the young science of geology by serving as a proving ground for the principles of uniformitarianism, in situ botanical origin of coal, and incompleteness of the fossil record (Waldron and Rygel, 2005, p. 337).

A second well-known area for polystrate fossils is in northern and eastern Yellowstone Park and vicinity, in which multiple layers of vertical trees have been noted in the "Eocene" Absaroka Volcanics since the late 1800s (Figure 2). Above Specimen Creek there are 48 levels of upright trees with 17 organic layers with no trees, representing a total of 65 levels (Coffin, 1997, see p. 9). Organic layers also are associated with the layers that contain vertical trees. However, these organic layers are not paleosols because they lack soil profiles, range from a trace to 20 cm thick, lack sufficient organic matter, and show evidence of water sorting (Coffin, 1997). The layers of trees have been defined as multiple forests that grew in place and were covered by volcanic breccia over a period of many tens of thousands of years, although it is admitted by some geologists that a minor proportion of upright trees were transported in lahars, similar to occurrences at Mount St. Helens (Yuretich, 1984).

The petrified trees of Ginkgo Petrified Forest State Park in Washington, just north of Vantage on Interstate 90 along the Columbia River, represent a third location for petrified trees that cut through more than one layer (Coffin, 1974; 1983; Oard, 1995a). The layers are basalt lava flows of the "Miocene" Columbia River Basalts of eastern Washington separated by thin interbeds. There are over 200 species of trees from widely divergent climatic zones—ranging from tropical jungles to the northern plains of Canada and Alaska. Tropical and subtropical trees include eucalyptus, teak, breadfruit, cinnamon, and gum. The northern temperate trees include spruce and birch. Beck (1945) noted that the trees lack bark and limbs, are associated with pillow lavas, and would have required sufficient water to keep them from burning. A number of petrified trees, some quite large, can be observed on a nature walk at the park. Some of the trees are buried *in the basalt at an angle* and do not appear to be burned.

Axel Heiberg Island at 80°N latitude in the Queen Elizabeth Islands of northeast Canada is a fourth classic example of polystrate fossils (Oard, 1995a). Mummified vertical trees and leaf litters were discovered at a number of levels within lignite (weakly developed coal) seams in the Geodetic Hills of Axel Heiberg Island. The paleoflora is exceptionally well preserved and well studied (Christie and McMillan, 1991). Although dated from the Eocene period in the uniformitarian classification (approximately 45 million years ago), some of the wood is not petrified and can be cut with an ax and burned! Upright trees are up to one m high and one m in diameter. They are water logged and often hollow. The trees have a root mass that flares out at the bottom, providing an in situ appearance. Horizontal logs up to 11.5 m long also are observed. Mummified, as well as petrified, trees also occur on other sites in the Queen Elizabeth Islands.

Large fossils, such as dinosaurs, can be polystrate if they extend into more than one layer of strata, or if they are found in fine-grained, thinly laminated strata, believed to have been deposited slowly. One interesting example is a whale fossil found in "Miocene" diatomite at Lompoc, California (Snelling, 1995). Diatomite is a sedimentary rock containing a high percentage of fossil diatoms, a single-celled type of algae that commonly lives at the surfaces of oceans or lakes. These diatoms sink, collecting on the bottom at very slow rates of a cm/1,000 years. Although this whale was discovered at an inclined position, its long axis is actually parallel to the diatomite layers, which had been tilted to a high angle. But still the whale represents a polystrate fossil because the whale would have become disarticulated and the bones destroyed at the slow rate of diatom deposition observed today. The whale and other fossils found at Lompoc imply rapid deposition of diatomite.

Just recently 346 well-preserved whales and other animals were discovered in "Miocene-Pliocene" diatomite in Peru by creationists from Loma Linda University (Brand et al., 2004; Oard, 2004). The whales covered an area of 1.5 km^2 within an 80-m thick layer of diatomite. These whales are polystrate, and their preservation cannot be explained by the slow sedimentation rates suggested by uniformitarian geologists.

What do Uniformitarian Geologists Say?

Uniformitarian scientists simply dismiss polystrate fossils by stating that they represent *local* rapid deposition. Derek Ager (1993) stated:

> Probably the most convincing proof of the local rapidity of terrestrial sedimentation is provided by the presence in the coal measures of trees still in position of life. (p. 47.)

Old-earth theistic geologist Davis Young (1982, p. 83) from Calvin College adds that the recognition of polystrate trees has made no impact on uniformitarian geologists, as if their response invalidates the argument. Their resistance to contrary evidence suggests a strong "faith" component to uniformitarianism. Young follows the example of other uniformitarian geologists and dismisses polystrate trees with the magic wand of *local* rapid burial, even in situations where the trees are allocthonous, or transported into place! Other than the existence of polystrate trees, uniformitarian geologists do not provide evidence for local rapid burial within their paradigm. Moreover, even if rapidly buried, the fossils also must be *rapidly petrified*, otherwise they would eventually rot underground. The scholarly approach would be to examine whether there really is evidence of simple local or more widespread rapid deposition and petrification.

On the Talkorigins (anti-creationist) web site, Andrew MacRae (1997) claimed that polystrate fossils were not a problem for nineteenth-century geologists, again suggesting that modern-day creationists have no case. Although the same as Young's (1982) argument, it is still invalid, depending on "truth by majority vote." MacRae discussed Dawson's early research on the Joggins petrified "forests." Dawson claimed that the trees have extensive root and root systems that penetrate into a coal seam or a paleosol (the underclay). Therefore, he concluded that the trees grew in place and were buried by local rapid deposition. Of course, he does not provide any evidence for such rapid deposition, other than the existence of the polystrate trees. MacRae further claims that in situ trees and "fossil forests" have been documented worldwide. The Joggins example, he claims, solved the polystrate fossil problem over 100 years ago, and creationists are simply out of date for not recognizing it—a typical ad hominem argument. Could it be that most nineteenth-century geologists were wearing uniformitarian blinders? Also, most of the polystrate fossil tree locations discussed show a lack of root balls, limbs, and bark.

Waldron and Rygel (2005, see p. 339) point out that the classical Joggins trees could not have been buried by one catastrophic depositional event. They instead suggest that the trees were buried by frequent, small sedimentation events on the order of 5–12 cm/yr. Thus, complete burial of the trees would have occurred within 100 years (the date likely dependent upon the length of time assumed for the unburied part of the trees to have rotted). However, the multiple, modest depositional events are not supported by any sedimentological evidence.

Ager (1993, see p. 49) calculated that at the average uniformitarian sedimentation rate of the British coal measures, it would take 100,000 years to bury a 10-m-tall tree. However, for the tree to have been buried in 10 years, the sedimentation rate would have to have been one m/year. He believes both estimates are clearly ridiculous and concludes that sedimentation was at times extremely rapid and that other times there was hardly any deposition! But he admits that the strata *look* both uniform and continuous! Ager (1993) candidly admitted that there is no evidence for rapid deposition, other than the trees themselves, and that the strata look like most other strata that are assumed to have accumulated slowly.

The burden of proof lies with the uniformitarian geologists, because there is rarely any evidence of local rapid deposition. It would seem that polystrate fossils in coal would falsify their speculation, since at least the coal is assumed to have formed very slowly.

Polystrate Trees in Alaska Coal Mines

We document another example of polystrate trees that show little or no

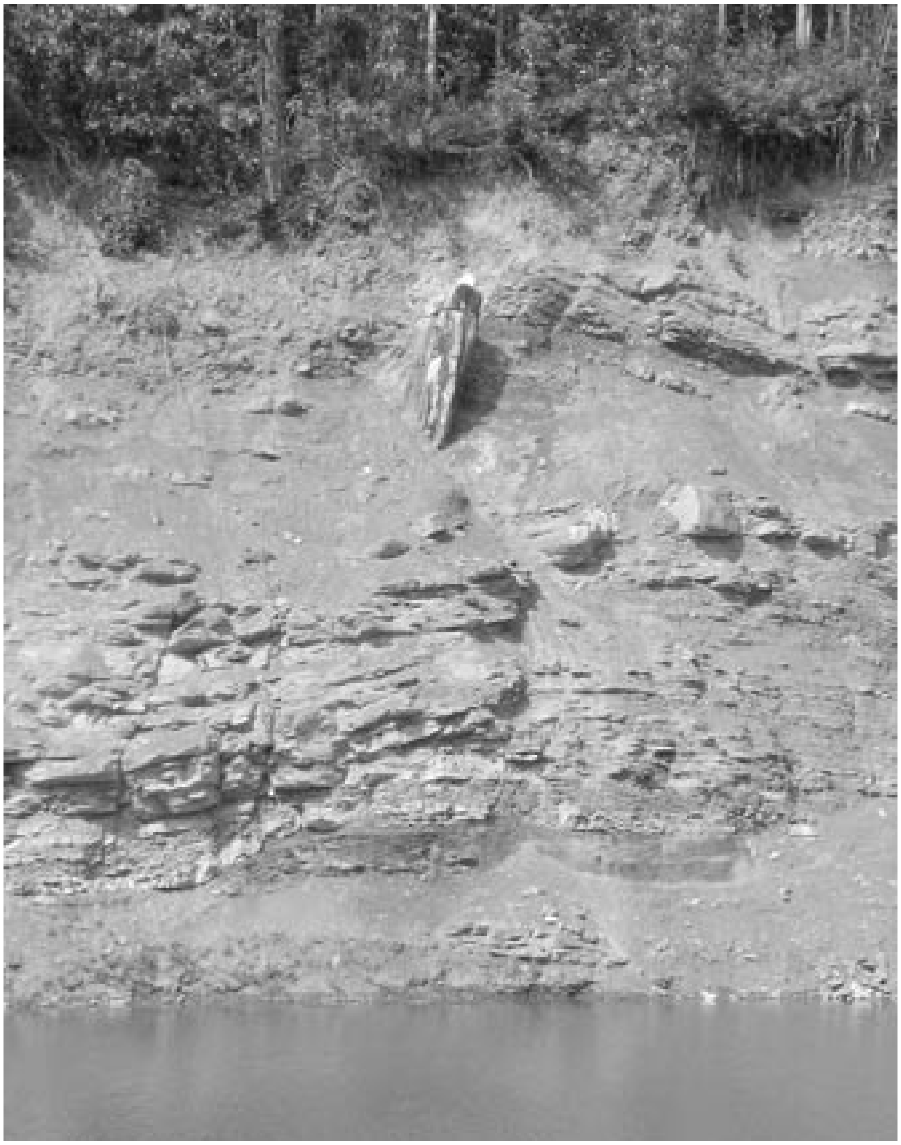

Figure 3 (*top left*). Polystrate tree from mine with only one tree. About 3 m of the tree is exposed.

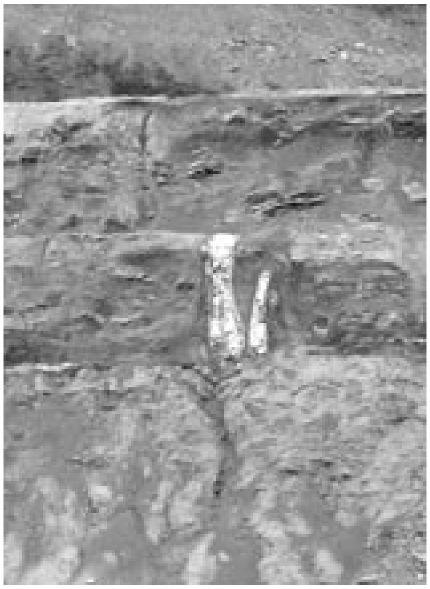

Figure 4 (*bottom left*). Two polystrate trees, up to about 4 m tall, from the third mine. The base of the largest tree is about 0.7 m in diameter.

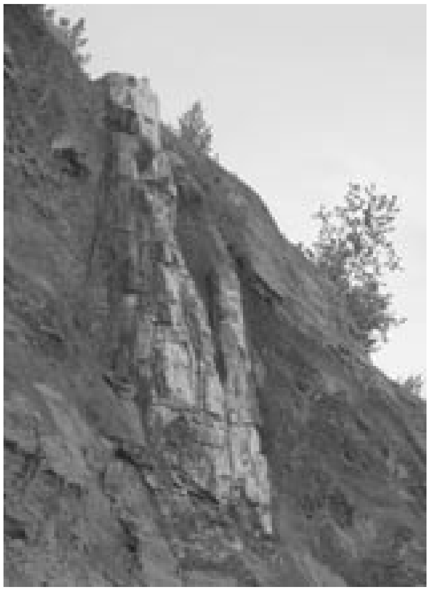

Figure 5 (*bottom right*). Close-up of polystrate trees in Figure 4.

evidence of locally rapid sedimentation (while writing this article, the lead author discovered that John Mackay [2003] had previously documented some of these fossils). We examined four open-pit coal mines located about 7 km north of Sutton, Alaska, which is 80 km northeast of Anchorage. These coal mines are located within the Matanuska Valley coal field, an eastern extension of the Cook Inlet-Susitna coal province (Anonymous, 1993). The coal deposits occur as part of the Wishbone Hill syncline within the Paleocene-lower Eocene Chickaloon Formation within the uniformitarian geological column. The coal mines are excavated on the north limb of the syncline with the beds generally dipping about 45° to the south. The four mines were all within two km of each other.

One of the mines that we examined had no polystrate trees, and the second mine had only one (Figure 3). We observed eleven polystrate trees at *different* elevations along the excavated cliff face in the third mine (Figures 4–6). The face of the cliff was about 30 m high. Some of the petrified logs had rings, while others did not. The strata are generally contorted adjacent to the logs, but the bedding is undisturbed beyond 2 m from the logs. There are also horizontal petrified trees, one about 8 m long (Figure 7). The trees range in height up to about 4 m tall (Figures 4 and 5). One stump was close to 2 m in diameter.

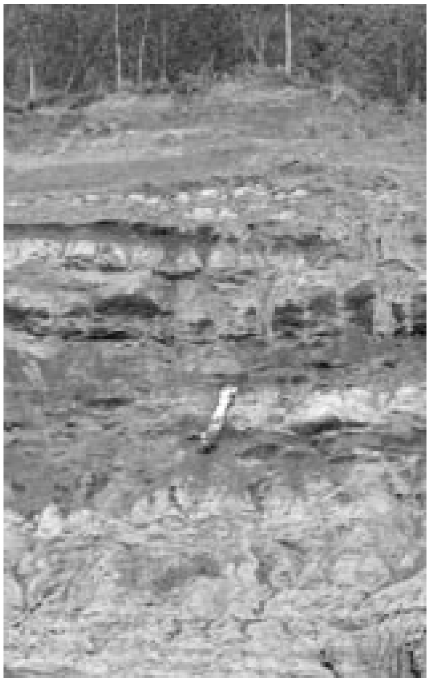

Figure 6. Another 3-m tall polystrate tree in the third mine.

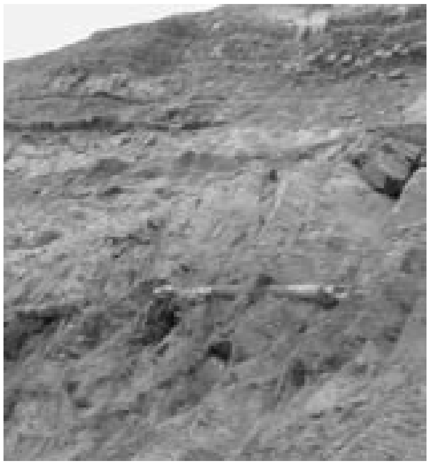

Figure 7. An 8-m long horizontal log.

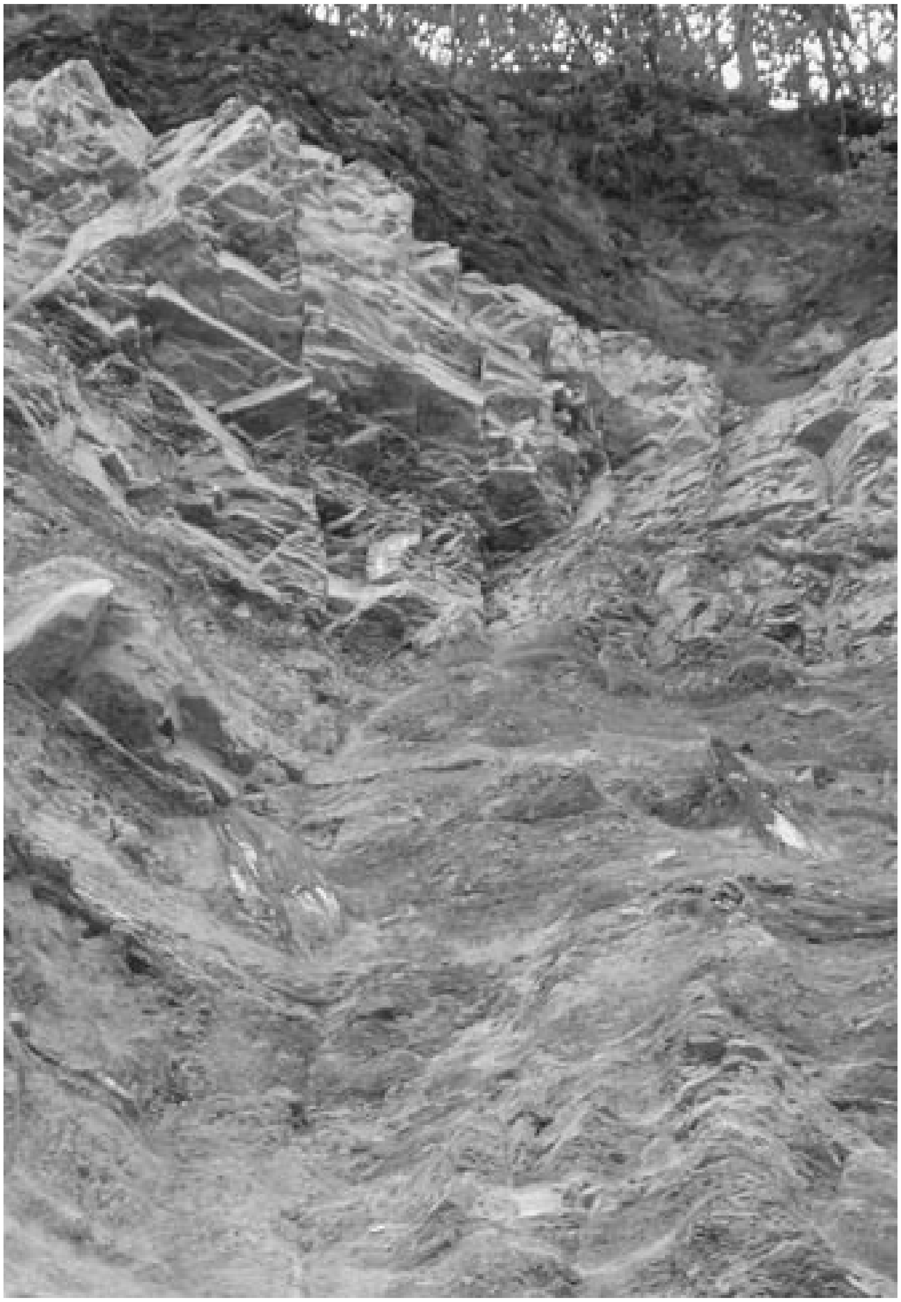

Figure 8. Two polystrate trees oblique to bedding in the fourth mine. About 1.5 m of the trees are exposed.

The fourth coal mine was similar to the third, but did not allow close access to the petrified trees in the approximately 40 m high cliff face. We observed about eight polystrate trees at several different levels on the cliff (Figures 8–12). A few of these logs were at an oblique angle to the bedding (Figures 8 and 11).

The strata were fairly evenly bedded in all four mines and consisted of alternating beds of coal, black shale, volcanic ash, sandstone, and pebble conglomerate (Conwell et al., 1982; Anonymous, 1993). Figure 13 shows an approximately 500-m long panorama of the third open-pit coal mine. There were a few minor faults, highlighted on the figure. So, if uniformitarian scientists want to appeal to local rapid deposition, *all* the strata had to be rapidly deposited across the whole area. However, the uniformitarian model of coal formation and the presence of multiple coal seams demand slow deposition. The uniformitarian geologists usually assume that peat built up in a swamp and was covered slowly

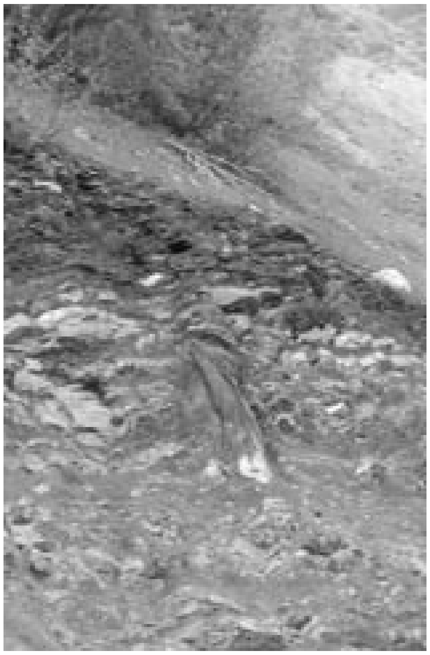

Figure 9. Polystrate tree from the fourth mine with about 3 m exposed.

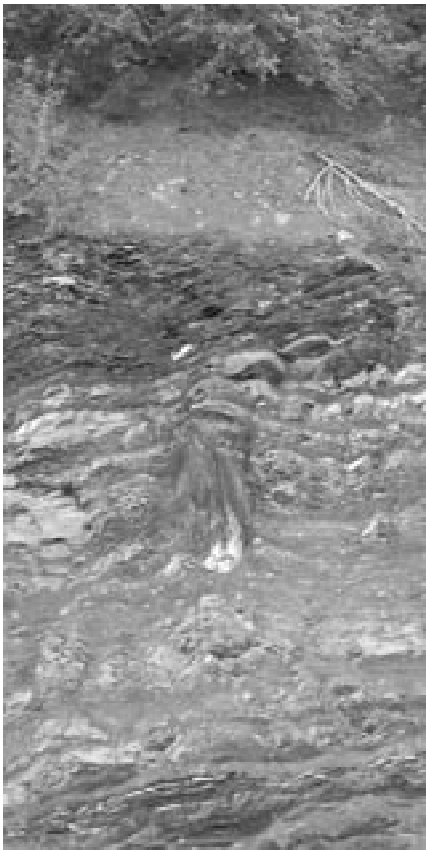

Figure 10. Another polystrate tree from the fourth mine with about 2 m exposed.

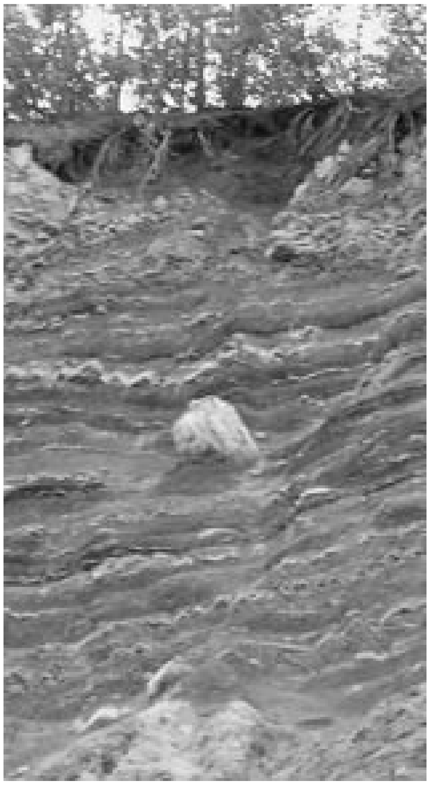

Figure 11. The end of a polystrate tree sticking out of the strata and tilted at an angle to the bedding in the fourth mine with about 0.5 m exposed.

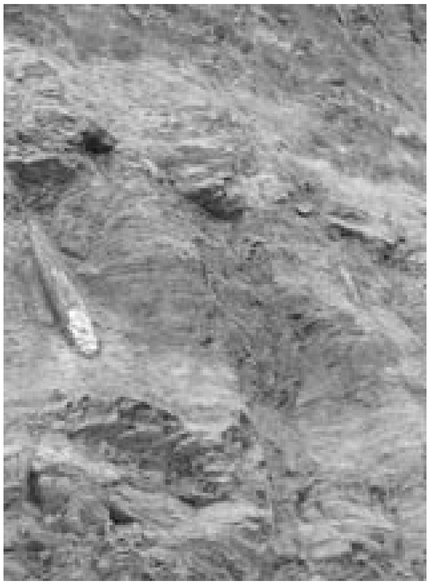

Figure 12. Two more polystrate logs in the fourth mine. The log on the left is about 2.5 m. The thinner polystrate tree to the right has about 1 m exposed.

by sediments. Much later, the peat is compressed to about $^{1}/_{7}$ of its original thickness and slowly turned to coal. So, the coal seams must represent thousands to tens of thousands of years of peat deposition to uniformitarian geologists.

But the polystrate trees defy this time interpretation and instead imply rapid deposition of all the strata. This, in turn, casts significant doubt on the uniformitarian coal model. Otherwise, the trees would have rotted prior to burial.

Polystrate Tree Explanation

How would diluvialists explain these upright trees, as well as other polystrate fossils? One explanation is that trees dropped vertically into the strata from a log mat floating on the water during the Genesis Flood (Coffin, 1983; Austin, 1987; Woodmorappe, 1999). During the Genesis Flood, vegetation dislodged by rising waters would float. Many trees would float in a vertical position because of their heavy root ball (Coffin, 1983). The floating log mat model has been applied to the upright trees in Yellowstone National Park (Coffin, 1997), as well as the polystrate trees in the alternating coal seams and other sediments from Axel Heiberg Island (Oard, 1995b). This model requires rapid emplacement of sedimentary beds, lava flows, and mass flows while trees sank.

This model was illustrated during the 1980 eruption of Mount St Helens that dumped a million logs into Spirit Lake (Coffin, 1983; Morris and Austin, 2003). Some of these trees sank to the bottom in a vertical position over time, mimicking the formation of polystrate trees at different levels.

This type of deposition of vegetation fits the evidence found at the open-pit coal mines in Alaska. For instance, leaf litter from both deciduous and evergreen trees is abundant along some bedding planes and shows little or no decay (Figure 14). Rapid sedimentation also would be required to preserve this litter.

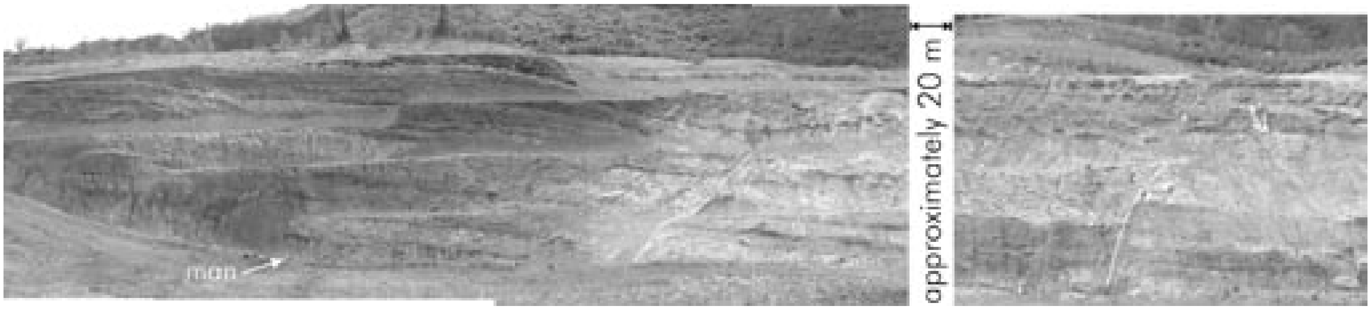

Figure 13. Panorama of the third coal mine starting from east and moving westward. Man for scale standing at the bottom of the excavated cliff at lower left. Note that the strata are evenly bedded with a minor fault toward the right. The section is about 30 m high and 500 m long.

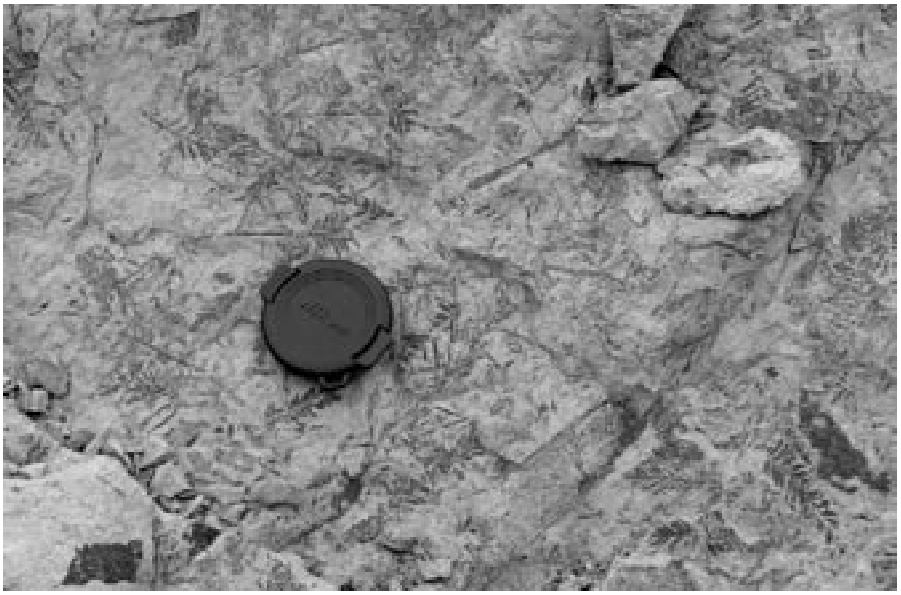

Figure 14. Coalified leaves and needles showing little if any decay. Lens cap for scale.

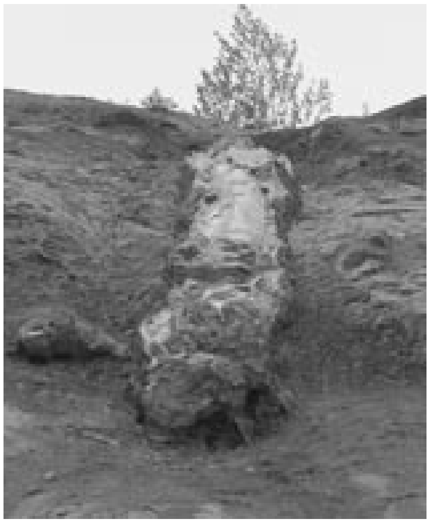

Figure 15. Polystrate tree about 3 m tall from the third mine showing no roots and a slight bowing downward of the strata.

Furthermore, the bottoms of some of the petrified trees showed *no roots* (Figures 15 and 16). Notice also in these figures that the tree seems to have pushed the strata *downward*. In Figure 16, the strata were bowed downward a distance of about 0.5 m. This would be unlikely if the trees grew in place. However, if the trees sank from a floating log mat, then soft strata would have been depressed into a bowl shape upon impact.

It is interesting that some of the petrified logs are both permineralized and coalified. Some logs were petrified on the interior, but coalified on the exterior. Figure 17 shows one of the numerous trees left by the miners after excavation of the third coal mine. The tree is coalified on the outside, but coalification only locally penetrates into the interior of the tree. In some of the trees with rings, the rings alternated between petrified and coalified (Figure 18). We do not understand the meaning of this pattern. Depending on the concentration of silica, other minerals, and the temperature of the Floodwaters, during and after burial of the trees, a combination of petrification, carbonization, and mummification can affect trees and other vegetable matter.

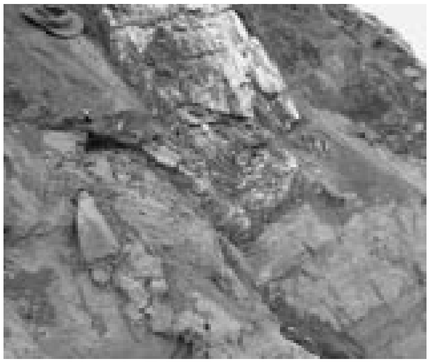

Figure 16. The lower portion of the left polystrate tree shown in Figures 4 and 5. Notice that the tree has no roots and bows the strata down about 0.5 m.

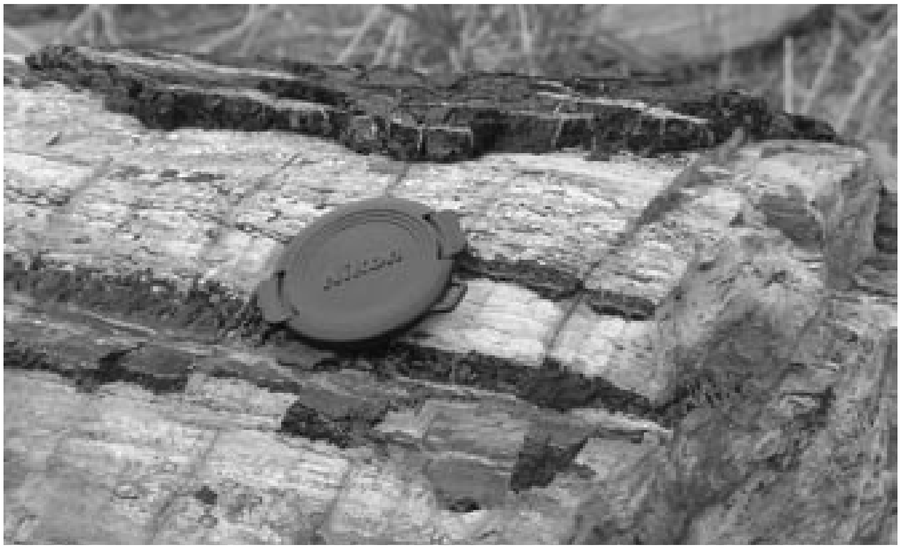

Figure 17. A petrified tree with a coalified rim that locally penetrates into the tree. There were numerous trees left by the miners in the third mine.

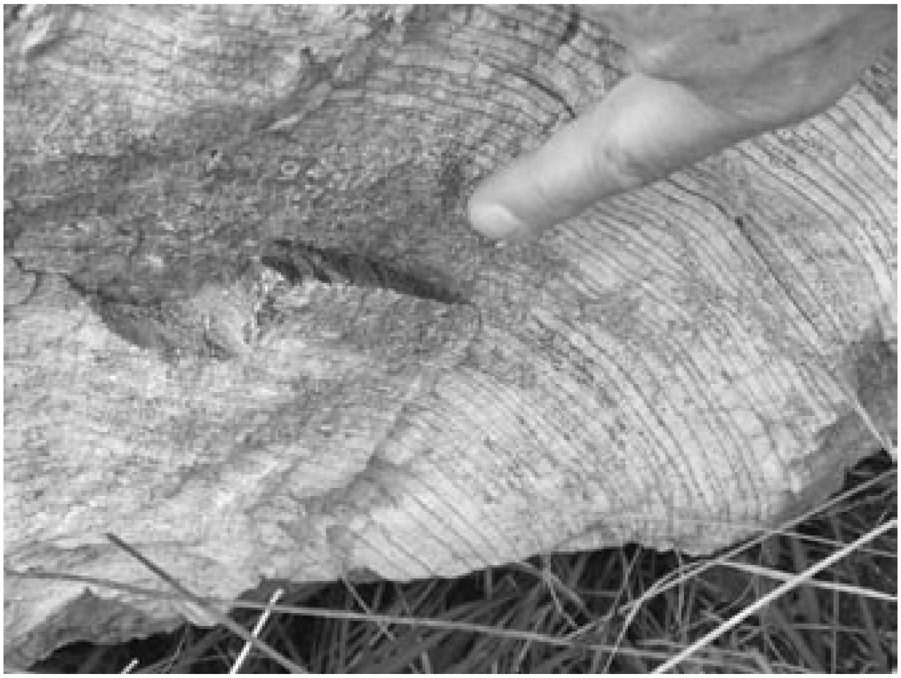

Figure 18. Alternating rings of petrified and coalified wood. The coalified part was narrow compared to the petrified part of the rings. The finger provides scale and points at the exposed part of one coalified ring.

Summary

Polystrate fossils are a strong indication of rapid sedimentation. A number of examples of polystrate fossils were briefly listed. Uniformitarian scientists simply appeal to local rapid deposition to account for polystrate fossils, but they rarely if ever have any evidence for rapid deposition, other than the trees themselves, that is consistent with similar sediments with no polystrate fossils. Thus, polystrate fossils are both positive evidence for rapid deposition and negative evidence for the validity of the uniformitarian paradigm.

Particularly difficult to explain are polystrate fossils found in coal mines. The uniformitarian "swamp" model emphasizes long periods of time. With this in mind, we examined four open-pit coal mines northeast of Anchorage, Alaska. There were about 20 polystrate trees, mainly in two of the mines. The trees were at different levels in the mines, indicating rapid deposition of all the strata, including the coal. The strata were generally evenly bedded in all four coal mines, and the mode of deposition would have been similar over the entire area.

Acknowledgements

We thank North Star Bible Camp of Willow, Alaska, for their generous hospitality in providing housing, meals, and wheels for the study of the open-pit coal mines north of Sutton. We appreciate Ian Juby supplying Figure 1 of a polystrate tree from the Joggins Formation of Nova Scotia. Two anonymous reviewers added helpful comments. This research was conducted with the aid of a grant from the Creation Research Society.

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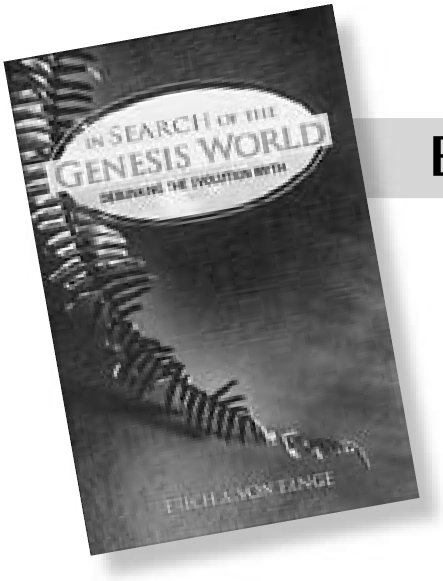

Book Review

In Search of the Genesis World: Debunking the Evolution Myth

by Erich von Fange

Concordia Publishing House, Saint Louis, 2006, 392 pages, $20.00.

Readers of this book will encounter a no-nonsense, comprehensive search for the Genesis history. In chapter 1 von Fange explores the fallacy that evolutionary science is objective, unbiased, and accurate. Chapter 2 presents a complete review of the place of metals in the possible development of the ancient world. By a very comprehensive list of references the author shows that dinosaurs appeared during creation week, they may have lived at the time of Job, some human footprints and dinosaur tracks together may be genuine, dragons are dinosaurs, and dinosaur species not already extinct were taken on board the ark and died later in harsh environments.

Citing the limitations of archeological research, von Fange covers three areas of scholarly archeology: field archeology, linguistic studies, and biblical studies, showing how they all fit neatly with what the Bible describes and teaches. There is an elaborate explanation and clarification on two attempts to verify "Joshua's long day" as recorded in Scripture, scientific explanations later proven false. The author concludes the long day really happened and that "The Bible does not need to be proved. It is believed by faith" (p. 100).

There is interesting coverage of "the art of misquoting Ussher" on the age of the earth. The author concludes, "Usher is roughly correct and the pronouncements of evolutionists are precisely wrong" (p. 113). Readers will enjoy the "incredible Piltdown hoax where von Fange states that "a skull made monkeys out of anthropologists" (p. 159).

The chapter on astronomy shows that this is the most speculative of all scientific fields. Examples of scientists being professionally punished for discovering data that contradicts the biased ideas of evolutionary astronomers support what Einstein said was true today: "A theory informs you of what you are permitted to see" (p. 16). The reader will discover that when it comes to the evolutionary explanation of extinctions, the denial of catastrophes in the past, and the supposed history of animal domestication, is "the blind leading the blind" (p. 179).

There are a few clever comments inserted into the text: "Interpretations begin with mountains of speculation based on molehills of evidence" (p. 199). "What does one do when irresistible bones are found in movable strata?" (p. 200). "Evolution's 'big lie': creation is factless faith and evolution is faithless fact" (p. 365).

In conclusion, the reader is led to a choice between faith in the Triune God of the Bible or faith in the triune god of evolution, that is, father time (unlimited billions of years), mother nature (only natural processes) and lady luck (chance probabilities). Erich von Fange has presented a strong case for the former.

David A. Kaufmann

The Range of Sizes of Galactic Supernova Remnants

Keith Davies*

Abstract

The traditional creationist model allows a very brief time for the growth in size of galactic supernova remnants. In this statistical study, I determine the expected range of supernova remnant sizes that have up to 6,000 years of expansionary growth. I show that the resulting size ranges are compatible with the published characteristics of the population of galactic supernova remnants that are of known size. Hence, the range of sizes of these supernova remnants is compatible with a creationist assumption that the galaxy is young.

Introduction

An average supernova remnant (SNR) is a vast and truly spectacular object. The diameter of a mid-sized SNR can be as much as twenty parsecs. To put this size into perspective, the distance from the Earth to the star Alpha Centauri is about three-fourths of a parsec. An average SNR is therefore sufficiently large to potentially contain a star cluster containing thousands of stars within its extended volume. The straightforward question that is posed in this paper is whether the observed range of sizes of these huge objects matches the sizes that would be expected in a galaxy that is everywhere less than 6,000 years old.

We will use a "five-number summary," and illustrative "box charts," to provide an easy and effective way to represent the observational data and to compare the data with the predicted range of sizes for galactic SNRs assumed to have been formed in the brief time frame of 6,000 years.

Five-Number Summaries

A five-number summary (we will just call them summaries for the rest of the paper) involves dividing each of the data sets to be compared into four parts with each part containing just a quarter of the data. The five boundary points are:

1. The lowest value in the data set.
2. The lower quartile Q_1. One fourth of the data set will lie below this boundary point.
3. The median Q_2 . One half of the data set will lie below the median.
4. The upper quartile Q_3. Three quarters of the data set will lie below this boundary point.
5. The maximum value in the data set.

A typical box-chart graphical representation of a five-number summary is shown in Figure 1.

Calculation of Summaries for the Observed Range of Sizes of 62 Galactic SNRs

The most recent radio surveys (Brogan et al., 2006) have now brought the total estimate of known SNRs in the galaxy to around 265. Measurements have been made of the distances to about 62 of these. The complete set of these 62 SNRs is listed in Table III using observational details taken from the comprehensive 2004 catalog of galactic SNRs of David Green (Green, 2004). This set of 62 SNRs is a most important data set. Without the distance to an SNR, it is impossible to determine its size and thus to formulate and confirm models of how they develop and grow. The 62 SNRs of Table III are shown in order of the size of their diameters, which will allow us to read the quartile and median values directly from the table.

The results from our set of 62 SNRs follow:

- The smallest diameter is taken as zero.
- The lower quartile Q_1 is the number 15 SNR in the table.

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Accepted for publication: August 3, 2006

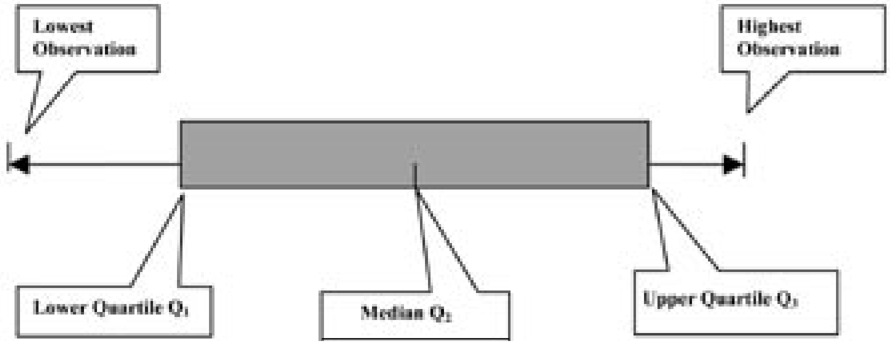

Figure 1. A box ch-art representation of a five-number summary

Observations show that its diameter is 13 parsecs.
- The median Q_2 is the 31st. Its diameter is 24 parsecs.
- The upper quartile Q_3 is the 47th. Its diameter is 47 parsecs.
- The largest SNR in the table has a diameter of 186 parsecs.

Establishing Creationist Predictions for the Range of SNR Sizes Expected in the Galaxy

The summaries for the creation model of this investigation are obtained by applying the well-accepted Sedov model for the growth of second stage SNRs. Details of the Sedov model, together with the published range of values of associated parameters, can be found in our Technical Appendix A and Technical Appendix B. We have used 10^{51} ergs for the initial expansion energy of an average SNR, since this value is the accepted value often quoted in the literature. On the other hand, the value for the average density of the interstellar medium (ISM) environment of SNR's is not so well established. Two sample sets of summaries will be given for two possible values of ISM density, n =~0.3 and n =~ 0.001, where n is defined as the number of "particles" in one cubic centimeter of the ISM. Further details are found in technical Appendix A.

- A *creationist prediction for the lowest value in the data set.* The lowest diameter is taken as zero.
- A *creationist prediction for the lower quartile Q_1 of the range of sizes of galactic SNRs.* In this creationist 6,000-year model, Q_1 is the diameter of an average second-stage SNR of age 1,500 years. Using a sample ISM density given by $n = 0.3$ gives an expected value for $Q_1 = 16$ parsecs (See Technical Appendix B). Using a sample ISM density of $n = 0.001$ gives a value of Q_1 =51 parsecs.
- A *creationist prediction for the median Q_2 of the range of sizes of galactic SNRs.* In the creationist model, Q_2 is the diameter of an average second-stage SNR of age 3,000 years. Using a sample ISM density given by $n = 0.3$ gives a value of 21 parsecs. With $n = 0.001$ we obtain Q_2 =67 parsecs.
- A *creationist prediction for the upper quartile Q_3 of the range of sizes of galactic SNRs.* In the creationist model, Q_3 is the diameter of an average second stage SNR of age 4,500 years. For $n = 0.3$ we obtain Q_3 =25 parsecs. With $n = 0.001$ we calculate Q_3 =78 parsecs.
- A *creationist prediction for the largest value of the range of sizes of galactic SNRs.* The largest size expected for SNRs in this creationist model would be for an age of 6,000 years with an initial energy that is in the higher range of published values. We will use an initial expansion energy of 10^{52} ergs for this calculation (details of the range of values of initial expansion energies are supplied in Technical Appendix A). Using a sample ISM density of $n = 0.3$ gives an expected largest diameter of around 45 parsecs. Using a sample ISM density of $n = 0.001$ gives an expected largest diameter of around 140 parsecs.

Results

Our results are shown in charts given as Figures 2, 3 and 4. We note that:

- There will always be the possibility that an observational bias might be present in the way that astronomers decide which SNRs are chosen for observations that will provide distance estimates. For example there could be an observational bias toward selecting brighter remnants over fainter ones. However, an SNR can appear particularly bright either because it is inherently a bright object or because it is particularly near the observer. Also, the 62 SNRs of Table III form a reasonably large sample, and a variety of methods are regularly used in order to obtain the distances to individual SNRs. This brings us a measure of confidence that the table is representative. Indeed, the processes of finding the distance to an individual SNR can sometimes be more serendipitous than selective.

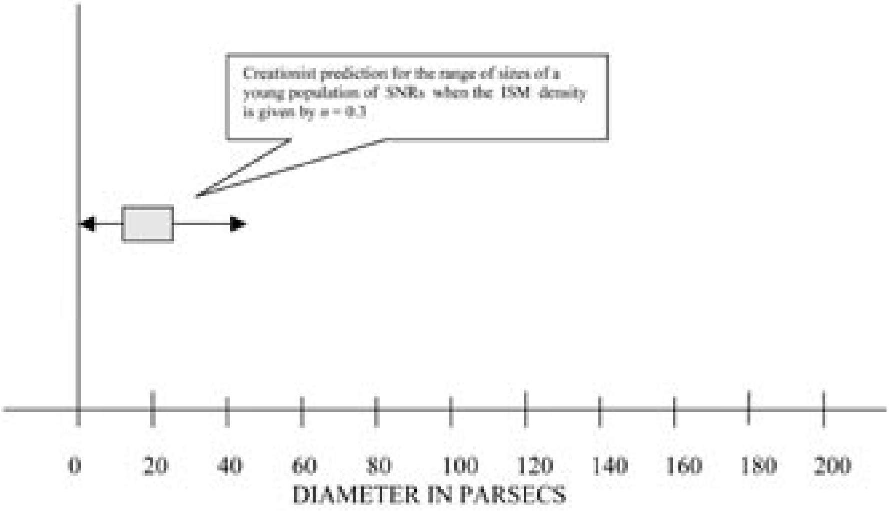

Figure 2. This box-chart represents creationist predictions for the range of sizes of SNRs of average expansion characteristics moving through an ISM of density corresponding to *n* = 0.3. This particular density has been estimated as applying to 20% of the ISM.

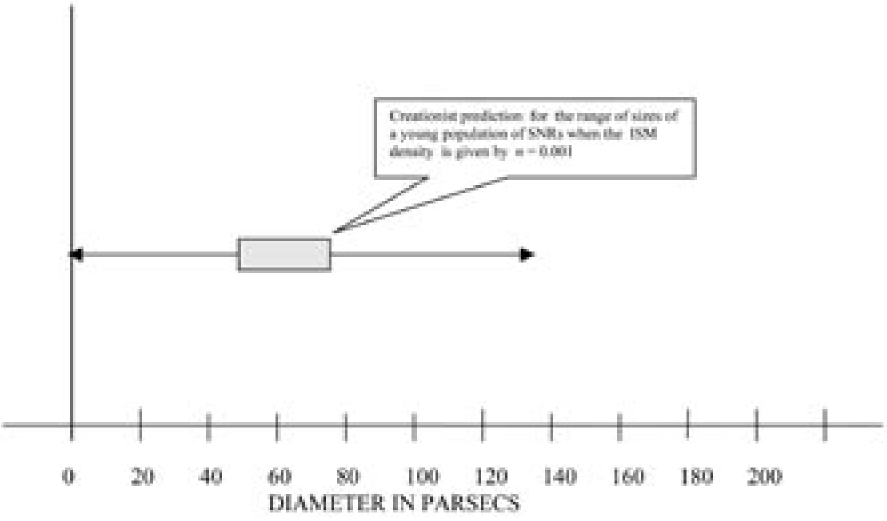

Figure 3. This box chart represents the creationist predictions for the range of sizes of SNRs of average expansion characteristics moving through an ISM of density corresponding to *n* = 0.001. This density has been estimated as applying to 70% of The ISM.

- The expected size achievable by an SNR over a period of 6,000 years is small in comparison to the range of sizes expected for galactic SNRs in an old-universe model. Even if we restrict our comparisons of the two models to the shorter but more readily observable second-stage of SNR development, the difference is still substantial. The median age of a second stage SNR is around 60,000 years and this, by equation (2) of the Sedov model would represent an SNR whose diameter would be 71 parsecs if we use n =0.3, or 221 parsecs if we use n= 0.001. Recall that, in comparison, the median diameter of the observed set of 62 SNRs is only 24 parsecs. It also should be noted that SNR radio emissions increase in power for the entire duration of the second stage. This important fact makes it likely that the range of sizes observable at radio wavelengths should include representatives of the entire theoretical range of second-stage SNRs.
- The two technical appendices provide only the very basic theoretical background required for an appreciation of the way that the five-number summaries are calculated. A more detailed theoretical analysis, together with a list of research topics and links to web-based sources of SNR data, is available upon request to kdavies1@hotmail.com

We can conclude that the creationist assumption that the galaxy is everywhere less than 6,000 years old is not in conflict with the range of sizes of currently observed galactic SNRs of known distances.

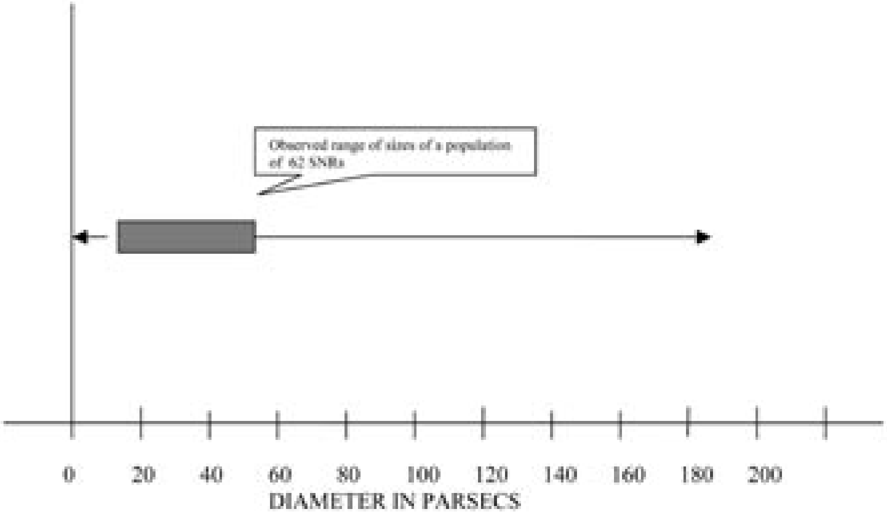

Figure 4. This box chart shows the observed range of sizes of the 62 SNRs of Table III.

Technical Appendix A

The Sedov Model and Related SNR Data

This appendix looks at the Sedov model for SNR growth and includes a review of the data, both observational and derived, that usually form part of the models of SNR development.

The Initial Kinetic Energy of an SNR

This is a significant expansion parameter and its value has a sensitive effect on the future development of any SNR. It will be labeled E_0 and will be measured in ergs. Published values are in range from 10^{50} to 10^{52} ergs, although some individual SNRs might have even higher values (Dyson, 1978, p. 155; Arbutina and Urosevic, 2005). Most SNRs are assumed to have an initial expansion energy that does not deviate significantly from 10^{51} ergs (Arbutina and Urosevic, 2005, p. 79). This is the value that will be used throughout this article for the value of E_0 for an "average" SNR. The value used for the highest expected value for E_0, will be 10^{52} ergs.

The Density of the Interstellar Medium that an SNR Passes Through

This will be represented by n, the number of "particles" per cubic centimeter.

Density is measured in this unusual way, but it allows meaningful comparisons to be made of the very low densities encountered in space. In the near vacuum of the interstellar medium, the density range is wide but is of the order of *one particle per cubic centimeter.* In the even sparser intergalactic medium, the standard of comparison is *one particle per cubic meter.* A "particle" in this context is an individual molecule or ion or, in the case of a dust cloud, an individual grain of dust.

The range of values for n in the galaxy is very wide. A small number of SNRs will be found in dense molecular clouds, where n can be greater than 100. However, for many years, an average value for n of just one particle per cubic centimeter was assumed in the literature. There are now good reasons for assuming that this estimate is incorrect and that a realistic average value for the ISM density is smaller than $n = 1$. One text (Mihalas and Binney 1981, p. 181) on galactic astronomy makes the following assertion:

- About 3 % of the volume of the ISM is associated with $n \sim 20$
- About 10 % of the volume of the ISM is associated with $n > 0.5$
- About 20% of the volume of the ISM is associated with $n \sim 0.3$
- About 70 % of the volume of the ISM is associated with $n \sim 0.001$

The values that will be used throughout this article as the best values for this important expansion characteristic of an average SNR are the two values above that together appear to apply to about 90% of the ISM, $n \sim 0.3$ and $n \sim 0.001$. The use of other values for these parameters, within the usually accepted ranges of average values, can be researched further but is not expected to show any significant changes in the findings of this paper.

The Age of an SNR

This will be labeled t and will be measured in years.

The Distance from the Earth to an SNR

This will be labeled d and will be measured in parsecs. Astronomers can measure the angular size of SNRs to a good degree of accuracy, but unfortunately this is not the case with measurement of the distances to individual SNRs. Any study of successive catalogs of galactic SNRs will reveal that some have had their published distances amended by a substantial factor.

The Angle Subtended by an SNR at the Earth

This will be labeled θ and will be measured in minutes of arc. This observational data can be used in conjunction with d to find the actual diameter of individual SNRs.

The Diameter of an SNR

This will be labeled D and will be measured in parsecs.

Modeling the Size of Second-Stage SNRs

The Sedov model is named after the astronomer who, in 1959, laid the foundations for the theoretical analysis of the long second stage of SNR expansion, which begins a few hundred years after an SNR is formed. The approach of Sedov is widely used. The Sedov relation assumes that the diameter of an SNR will approximate $D \propto t^{2/5}$ rather than the $D \propto t$ relation of the relatively brief first stage (Mihalas and Binney 1981, p. 543).

We can write the Sedov relation as

$$D = k\,t^{2/5} \qquad \text{Equation (1)}$$

A theoretical estimate for the value of k can be obtained from an analysis of the physical factors that underpin its value. Such an analysis has been carried out (Clark and Caswell 1976, p. 279). The relation is expressed as:

$$D = 4.3 \times 10^{-11} (E_0/n)^{1/5}\, t^{2/5} \qquad \text{Equation (2)}$$

The Duration of the Second Stage

The length of time an SNR will remain in its second stage of expansion will be determined by its initial expansion characteristics and the characteristics of the medium it is moving through. One estimate (Cioffi and McKee 1988, p. 435), using $E_0 = 10^{51}$ ergs for the initial energy and $n = 0.1$ for the density of the interstellar medium it passes through, gives the duration of the second stage as 120,000 years.

The Radio Luminosity of Second-Stage SNRs

A useful theoretical study (Cioffi and McKee 1988) has shown that the total luminosity of an average SNR will ***increase*** by nearly 200 times during the second-stage period of 120,000 years. It will increase from about 10^{36} ergs s^{-1} to 1.9×10^{38} ergs s^{-1}. (or 10^{29} watts to 1.9×10^{31} watts). This important characteristic of a second-stage SNR—the continual increase in power through the duration of the stage—occurs because the SNR sweeps up increasing amounts of dust and gas. This will then increase the numbers of individual electrons that are emitting synchrotron radiation.

Technical Appendix B

Calculating the Five-Number Summaries

Equation (2) will be used, in conjunction with published values for major expansion parameters, to determine the expected sizes (D) of SNRs at the five boundary values needed for the five-number summaries.

The quartile boundary sizes in this creation model are assumed to correspond approximately to the sizes of an average SNR of ages 1,500 years, 3,000 years and 4,500 years. The largest size of an SNR is assumed to correspond to the size of a 6,000-year-old SNR with an initial energy that is in the higher range of published values.

The values used for the expansion parameters are those referenced in technical appendix A. An "average" SNR is assumed to be one with initial expansion energy of 10^{51} ergs moving through an ISM whose densities are defined by the two sample values of n=0.3 and n=0.001.

The maximum size for SNRs in this creationist model is defined as the size of a 6,000-year-old SNR with an initial expansion energy of 10^{52} ergs.

In Table I and in Table II:

- Column 2 will show the value of E_0 being used for the calculation of SNR diameters.
- Column 3 will show the value of n being used for the calculation of SNR diameters.
- Column 4 will show the value of t being used for the calculation of SNR diameters.
- Column 5 will show the actual calculation results for D using equation (2).

In Table III:

The first three columns identify the SNR and provide the published values for d and θ that have been obtained from a number of independent surveys, all of which are referenced in the 2004 catalog of Green. The fourth column shows the calculated values of the diameters of these 62 SNRs from the relation $D=1000\,\pi\,\theta\, d/(180 \text{ x } 60)$. The result of this calculation is in parsecs.

Occasionally two distance estimates in the catalog will be shown for the same SNR. If these distances are reasonably close in value, they will be averaged. If they are very different, then the corresponding values of D will be calculated for each distance and both results will be shown in the table.

Table I. Creationist predictions for the range of sizes of SNRs expected over a period of 6,000 years and moving through an ISM of density corresponding to n = 0.3

	E_0 (In ergs)	n (In atoms per cubic centimeter)	t (In years)	SNR Diameter (Calculated in parsecs)
minimum value	$1.0\text{X}10^{51}$	0.3	0	0
first quartile calculation	$1.0\text{X}10^{51}$	0.3	1500	16
second quartile calculation	$1.0\text{X}10^{51}$	0.3	3000	21
third quartile calculation	$1.0\text{X}10^{51}$	0.3	4500	25
maximum value calculation	$1.0\text{X}10^{52}$	0.3	6000	45

Table II-Creationist predictions for the range of sizes of SNRs expected over a period of 6,000 years and moving through an ISM of density corresponding to n = 0.001

	E_0 (In ergs)	n (In atoms per cubic centimeter)	t (In years)	SNR Diameter (Calculated in parsecs)
minimum value	$1.0\text{X}10^{51}$	0.001	0	0
first quartile calculation	$1.0\text{X}10^{51}$	0.001	1500	51
second quartile calculation	$1.0\text{X}10^{51}$	0.001	3000	67
third quartile calculation	$1.0\text{X}10^{51}$	0.001	4500	78
maximum value calculation	$1.0\text{X}10^{52}$	0.001	6000	140

Table III. The set of SNRs of known distances as referenced in the comprehensive 2004 catalog of galactic SNRs of David Green.

Identification of SNR (name, or galactic coordinates)	**Distance, *d*** (parsecs)	**Average, angular size θ** (arcmin)	**Diameter, D** (parsecs, calculated from *d* and θ)
Kepler-Historical SNR AD 1604	2900 or 5000	3	3 or 4
Crab Nebula-Historical SNR AD 1054	2000	6	3
CTB 33	11000	1.5	5
Cassiopeia A, Possibly late 17th century historical SNR	3400	5	5
G 021.5 B0.9	5500	4	6
G 011.2 -0.3	5000	4	6
Tycho-Historical SNR AD 1572	2500 or 3500	8	6 or 8
SN1181- Historical SNR AD 1181	3200	7	7
Kes 75	9000 or 21000	3	8 or 18
C397	7500	3.5	8
4CB04.71	6700	4	8
RCW 103	3300	10	10
CTB 87	6100 or 12000	7	12 or 24
G 349.7+0.2	20000	2.25	13
W49B	13000	3.5	13
IC443	1400	45	18
3C391	8500	6	15
R5	1200	45	16
C396, HC24, NRAO 593	7700	7	16
HC24	7700	7	16
G 330.2+1.0	4900	11	16
DA 530	2500	23.5	17
MSH 11-54	6200	10	18
Kes 41	9300	7.5	20
3C400.2	2300 or 6700	30.5	20 or 59
Vela (XYZ)	300	255	22
W44	2500	31	23
Cygnus Loop	400	195	23
Kes 17	9700	8	23
SN1006 -Historical SNR AD 1006	2600	30	23
HB21	800	105	24

Table III (continued)

Identification of SNR (name, or galactic coordinates)	**Distance, *d*** (parsecs)	**Average, angular size θ** (arcmin)	**Diameter, D** (parsecs, calculated from *d* and θ)
CTB 109	3000	28	24
MSH 15-57	17400	5	25
Kes 27	4800	21	29
Kes 79	10000	10	29
G 315.9 -0.0	2500	42	31
(HC30)	7800	15	34
CTB 1	3400	34	34
Puppis A	1500	55	24
G 266-1.2	1000	120	35
CTB 104	1500	80	35
W51	4100	30	36
Kes69	6300	20	37
Milne 56	4300	35	44
CTB 37A	10200	15	45
(MSH 14-57)	7200	22	46
G 1156-62	9600	17	47
G 13.3 -1.3	3000	55	48
W28	3500	48	49
CTB 37B	10200	17	50
MSH 15B52, Possibly historical SNR AD 185	5200	35	53
VRO 42.05.01	4500	45	59
G 65.3+5.7	800	280	65
G 312.4 -0.4	6000.0 or 14000	38	66 or 155
G 55.0+0.3	14000	17.5	71
G 114.3 +0.3	3400	72.5	72
Monoceros Nebula	1200	220	77
G 116.5 +1.1	4400	70	90
G 347.3-0.5	6000	60	105
W 50	5000	90	131
HB9	4000	130	151
IS 184	8000	80	186

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Book Review

Passive Fear: Alternative to Fight or Flight: When Frightened Animals Hide

by E. Norbert Smith

iUniverse, 2021 Pine Lake Road, Suite 100, Lincoln, NE, 2006,
124 pages, $14.00.

Here is a very personal, revealing, and primarily scientific autobiography by an intriguing individual, E. Norbert Smith. His main interest is the physiology of reptiles, and secondarily mammals. Smith invented many small radio telemetry devices for implantation in various animals. The equipment broadcasts body heat, heart rate, etc. The information so gained has proved valuable for understanding behavior and even sudden infant death syndrome in humans.

Author Smith is a former CRS board member and remains an active Christian and an anti-evolutionist. The creation worldview is not strongly presented in this book which emphasizes scientific research. However, there are statements favorable toward Christianity and critical of evolution. For example, in the memorial (page v) he credits his parents for instilling within him "a lasting awe and respect for all things living, and for their Creator. That wonderment continues to deepen with a life devoted to studying animals great and small." Also, at the beginning of each of the book's 15 chapters is a quotation, several of them Bible verses.

On page 25 Smith says, "There once was a list of 186 human organs thought to be useless relics of our evolutionary past. As knowledge replaced ignorance, that list dwindled to oblivion. All our parts function." On page 86 he tells about his early childhood memories when, "Two or three times each year missionaries from around the world visited our church and told of their work."

The book has only 124 total pages including title pages, memorial, contents, foreword, acknowledgments, prelude, 15 relatively-short chapters which include photographs and drawings, references and additional reading, meet the author, and a helpful 4-page index.

The book is a realistic concise presentation of an effective research career. I highly recommend this captivating book which can be read in a single sitting. It also could be an appropriate gift for a biologist relative or friend, or others with an interest in biology. It should have a place in sections of libraries dealing with natural history and research.

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Book Review

Passive Fear: Alternative to Fight or Flight: When Frightened Animals Hide

by E. Norbert Smith

iUniverse, 2021 Pine Lake Road, Suite 100, Lincoln, NE, 2006,
124 pages, $14.00.

Although written in a conversational style explicitly for the average reader, this book reviews many important scientific studies about the physiological and behavioral responses of wild animals to fear. The possible animal responses to fear are to run, fight, hide, or play dead. In this book, author Smith also reviews in detail his over thirty years of field research on the topic. He has discovered (largely by accident) that, contrary to the predictions of Darwinism, many animals, both predators and prey, respond to fear by, not only fight or flight (the defense response), but often by lowering their heart rate and playing dead, or at least comatose. Their heart beat jumps as they flee danger, then they hide, and their heart rate drops significantly. In the case of alligators, heart rates dropped from 32 beats per second to under two (p. 24).

The discovery has overturned several decades of research indicating that, with rare exceptions, such as the opossum, the only animal reaction to danger is a defense response. Smith studied woodchucks, rabbits, alligators, squirrels, sloths, chipmunks, turtles, lizards, cats, opossums and other animals. Smith also provides new understanding about the physiology of animals that dive underwater.

E. Norbert Smith holds a Ph.D. in zoology. He has written more than two hundred technical papers, and has published dozens of articles in his area. For his research, Smith has obtained grants from numerous scientific organizations including the National Institute of Health, National Science Foundation, and the National Geographic Society. His alligator research was featured in the BBC TV documentary titled *A Smile for the Crocodile*. Smith is truly fascinated with animals and it shows on every page of this book.

Humorous personal anecdotes abound in the book, such as Dr. Smith trying to explain to a visiting representative of his grant foundation how friendly wild woodchucks are as the animal was biting into his forearm (p. 32). One European researcher who worked with Smith, Oxford University Ph.D. Geir Gabrielson, deliberately exposed himself to spray from a skunk to understand first hand the animal's defensive behavior (pp. 80–81). As readers are working through the adventures of these intrepid researchers, they will gain valuable insight into how science actually operates. This work is part autobiographical, part science history, and part an exposition of the real world of science. Perhaps due to propaganda from the scientific community itself, most of the literate public assume that scientists are objective purveyors of the truth about the natural world. Smith effectively shows that scientists have their own biases, agendas, and even "political correctness" as do their colleagues in the "soft" sciences such as sociology and psychology.

One example which Smith cites in detail is that he was unable to publish his opossum research because he used a "natural" predator (a family dog, firmly under his control) to induce the fear response in the animals that he used in his research (p. 83). Although his work has led to important insight into sudden infant death syndrome (the largest single cause of death for infants from six weeks to two) which could lead to saving lives, no American scientific journal would publish the study (pp. 84–85). The journals feared protests from animal rights activists despite the fact that no animals were harmed in any way by the study.

Smith's conclusion that all animal behaviors are purposeful, a belief that ultimately is informed by faith, is indicated by hints within the book. It was his creationist beliefs that led Smith to research the "passive fear" response that he observed in animals. Despite the claims of some scientists, a scientist can gain inspiration from religious concepts, just as a good theologian can gain insight into theology from science (as the historical field called *natural theology* demonstrates). Also, despite the claims of some, this book demonstrates that Intelligent Design can inspire research. As Smith demonstrates, a reverence for creation, a love of animals, and good scientific research go well together. I strongly recommend Smith's work to anyone with an interest in animals and science.

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Notes from the Panorama of Science

The Pillars of Evolution Are Crushed by Microscopic Things

God Can Use Small Things

A consistent theme in the Bible is that the Lord delights in small things. Throughout history He has frequently chosen seemingly insignificant people, events, or objects to accomplish His purposes. In Romans 4:17, for example, Paul noted that God is one who: "gives life to the dead and calls those **things which do not exist** as though they did" (NKJV). Thus Abraham, who had no children, trusted God and thereby became the father of many nations. He is deeply revered by many millions of people to this day.

In I Corinthians 1:27–28 we are instructed to delight in our own weakness and depend upon God's strength and mighty power because:

> God has chosen the foolish things of the world to put to shame the wise, and God hath chosen the weak things of the world to put to shame the things which are mighty; and the base things of the world and the things which are despised God has chosen, and **things which are not**, to bring to nothing the things that are. (NKJV)

God succeeded in populating the earth with just two people—Adam and Eve. The whole earth was later deluged, submerged, and wiped clean of all mankind except for eight souls. It is from this small number of God-fearing people that God started over, and we all have descended from them. Moses, a murderer and fugitive from justice, hiding out in the desert, was handpicked by God to lead the Israelites out of Egypt (Exod. 3:10–11).

Only two of the twelve spies who went to examine the land that God planned to give to the children of Israel trusted that God could do what He claimed—Caleb and Joshua (Num. 14:6–9).

The widow's meager stash of meal and oil kept on supplying food. There was the "still, small voice" by which God finally communicated with Elijah. The insignificant shepherd boy named David defeated the giant Goliath and became a king. The money for taxes secured by Peter came from a fish's mouth, and a few pieces of bread and fish from a young boy became enough to feed thousands of people.

Zerubbabal led the Israelites in rebuilding the temple—a building that would not be nearly as grandiose or ornate as the temple of Solomon, which the Babylonians had demolished. God sent this message to encourage the workers in what must have been a discouraging and daunting task: "For who has despised the day of **small things**?" (Zech. 4:10, NKJV).

Like many microscopists, I have devoted much of my adult life to studying **small things**. These little objects really do exist, but without the help of microscopy, they would fall into the category of "**things which are not**" because they are not visible to the unaided eye. Microscope objective lenses have been aimed at many small items in numerous scientific disciplines and with great profit (financial and otherwise). In each field of study, some of the discoveries involving the microscope show that such **small things** nullify the very foundational assumptions, or "pillars," upon which the theory of macroevolution rests.

Similarities, Differences, Natural Selection, and Survival of the Fittest

When we observe the many organismic kinds on Earth, we note that they all share some identical characteristics, such as the use of DNA for genetic transfer of information. The theory of evolution attempts to explain that these similarities arose via descent with modification:

> The concept of biological evolution…accounts for the *relatedness* among organisms by explaining that the millions of different species of plants, animals, and microorganisms that live on earth today *are related by descent* from common ancestors—like distant cousins. (National Academy of Sciences, 1998. Emphases are mine).

There is a bewildering array of different kinds of organisms that occupy every conceivable habitat Earth has to offer. Each organism appears to be perfectly fitted into its unique habitat by way of its distinctive characteristics. Therefore, although there is similarity across all life-forms, there is also wide diversity. The theory of evolution states that this diversity came about as a result of the struggle for existence between organisms on Earth. This struggle for existence was called "natural selection" by Charles Darwin as explained by the NAS document:

> Individuals that have heritable characteristics making them more likely to survive and reproduce in their particular environment will, on average, have a better chance of passing those characteristics on

> to their own offspring. In this way, as many generations pass, *nature would select* those individuals best suited to particular environments (National Academy of Sciences, 1998. Emphasis mine).

Creationists agree that natural selection does occur, in that better suited organisms "out-survive" less suited ones of the same kind when there is competition for limited resources. This alone, however, does not explain the mechanism by which the survivors would improve on the genes of their parents. The struggle for life and natural selection are nevertheless kingpins to the theory of evolution.

> This straightforward process, which is a natural consequence of biologically reproducing organisms competing for limited resources, is responsible for one of the most magnificent chronicles known to science. Over billions of years, it has led the earliest organisms on earth to *diversify* into all of the plants, animals, and microorganisms that exist today. Though humans, fish, and bacteria would seem to be *so different as to defy comparison*, they all share some of the characteristics of their common ancestors. (National Academy of Sciences, 1998. Emphases are mine).

Evolution purports to explain *all of the similarities and all of the differences* we see in living organisms today (as well as those seen in the fossil remains of once-living organisms). On the other hand, the theory of creation by a Master Designer more easily explains the differences and similarities observed in these organisms.

Microevolution or Macroevolution?

It is well known that small changes do occur within "kinds" of organisms. For example, the many varieties of cats, dogs, and birds are testament to the variations that are noted within the cat kind, the dog kind, and the bird kind. This type of variation, sometimes called *microevolution* by creationists, is beyond question and could result in the production of a new species or even a new genus but not a major new "kind" of organism. Recent work has been done to begin to explain this "variation within a kind" by means of a creationist classification system known as *baraminology* (Wood, et al., 2003). Thus, creationists fully agree that microevolution, or change within a kind, does occur.

Creationists reject the position taken by evolutionists (such as the editors at the National Academy of Sciences) that these small changes over vast periods of time became such large changes that entire *new kinds* of organisms resulted:

> The best available evidence suggests that life on earth began more than three and a half *billion years* ago. For more than two *billion years* after that, life was housed in the bodies of many kinds of tiny, single-celled organisms, some of which produced the oxygen that now makes up more than a fifth of the earth's atmosphere. Less than a *billion years* ago, much more complex organisms appeared. By about half a *billion years* ago, evolution had resulted in a *wide variety* of multicellular animals and plants living in the sea that are the clear ancestors of many of the *major types of organisms* that continue to live to this day (National Academy of Sciences, 1998. Emphases are mine).

The National Academy of Sciences document thus promotes a theory that heavily relies on billions of years to produce a "wide variety" of "much more complex organisms" including the "major types of organisms" found on Earth today. The theory of evolution, as presented by the National Academy of Sciences, claims that all the myriad of diverse life-forms on earth, from the microorganisms in puddles to the giant squids in the depths of the sea, descended from common ancestors over *billions of years* by macroevolution. There is little evidence to support this theory of macroevolutionism, in spite of the estimated 100 million fossils that have been recovered to date, and in spite of 100 years of irradiating fruit flies and other organisms to induce mutations. All experimental work continues to show that fruit flies are still fruit flies.

Without Chance and Long Ages, Macroevolution Would Not Have a Prayer

When any concept or proposal is completely indefensible or extremely unlikely, most people say that it "doesn't have a prayer." This would be true of macroevolution theory if it could be shown that the postulated billions of years of Earth history never existed and that chance modifications cannot account for the origin of well-designed organisms. Since changes in organisms above the species level have never been observed, it is assumed by evolutionists that vast periods of time are required to effect such dramatic changes. Believers in macroevolution rationalize this glaring deficiency by boldly speculating that evolutionary change occurs so slowly that it cannot be seen. They depend on billions of years to perform changes that are not measurable by science. Without these vast ages of billions of years, macroevolution theory would be bankrupt. Billions of years of geologic time therefore take center stage as one of the major pillars of evolution.

It also must be shown by evolutionists that bats and bees are not engineered beings but rather by-products of the chance shuffling of genes during the reproduction sequence. To invoke design is to call upon a Designer—a concept that is unthinkable to many evolutionists. Many of them consider that modifications occurring by chance across vast ages of time somehow can explain the *design evident* in nature. Therefore, if it could be shown that chance alone will not produce complex, living systems, macroevolutionists would be forced to abandon their theory. All that is encompassed by the theory of evolution thus rests on these two foundational "pillars": chance and vast ages of time. Random assemblage by chance is believed to have yielded everything from microbes to man, without any plan or any purpose. Therefore, if science shows that these purported vast ages did not exist and that chance is ineffective, then the long battle against God's revelation to man would end. If evolution itself doesn't have a prayer, then evolutionists would "have to pray" in the sense of acknowledging and respecting the role of the Designer in origins!

God's Word stands in stark contrast to macroevolution. God alone knows how the heavens and the Earth were created, for He alone made observations at the time of their creation: "For in six days the Lord made the heavens and the earth, the sea, *and all that is in them*, and rested the seventh day" (Exod. 20:11, NKJV. Emphasis mine). The Bible is the weapon needed to tear down the stronghold of evolutionism: "For the weapons of our warfare are not carnal but mighty in God *for pulling down strongholds*, casting down arguments and every high thing that exalts itself against *the knowledge of God*" (II Cor. 10:4–5 NKJV. Emphases are mine). The microscope enables us to stand powerfully against the vacuous arguments of evolutionists.

How Can Design Be Recognized?

The microscopic world has provided abundant examples of design that could not have been formed by chance, no matter how much time might have elapsed. But the first question we might answer is: What is design, and could we recognize it if we saw it? Merriam-Webster's dictionary defines *design* as "deliberate purposive planning," "an underlying scheme that governs functioning, developing, or unfolding," and "a plan or protocol for carrying out or accomplishing something" (Merriam-Webster, 2002). Thus a scheme, a plan, or a protocol of some sort, which produces something as a result of implementing that scheme, plan, or protocol, seems to define what a design is. Often, however, we are not privy to the scheme, the plan, or the protocol, which may have been implemented to produce a certain designed object. We accept that the dentist is placing *designed* instruments into our open mouth, even though we never went to dental school to learn about them. It seems reasonable to assume that the average person can distinguish a designed object from a chaotically formed one. It may be an entirely different matter to expect people to *define exactly* what a designed object is, but they know one when they see one.

The editors of the National Academy of Sciences document seem to know what design is too, yet they claim that evolution can account for design in biological systems.

> Evolution is a series of changes, some gradual and some sporadic, that accounts for the present form and function of objects, organisms, and natural and *designed systems*. The general idea of evolution is that the present arises from materials and forms of the past (National Academy of Sciences, 1998. Emphasis is mine).

The well-known zoologist and vociferous anti-creationist, Richard Dawkins, has written and spoken extensively in favor of the idea that design exists without a Designer.

> A spider doesn't *know* how to make a web as a fisherman knows how to make a net. Spider genes are a *recipe* for legs, muscles and spinnerets, together with a brain whose wiring diagram causes it to manipulate muscles in such a way that a web automatically results. The spider—presumably—*knows nothing* of webs or flies, any more than you knew how to build yourself during your nine months of unconscious gestation. Genes literally *don't know anything*, but in a powerful sense *they store knowledge about environments from the ancestral past*…but how is the information read out of the environment and into the genes? This is the indispensable role of natural selection, the stunningly simple yet powerful engine of evolution first discovered by Charles Darwin, although he expressed it differently. (Dawkins, 2006. Emphases are mine)

Dawkins did not here define the concept of design in biological systems, but he tried to make the case that design in a spider is simply the result of information that has been pooled and stored by genes over vast periods of time. He then maintained that it was the varying conditions in the environment that were "communicated" somehow to the genes, and this "information" was stored there for future use by other organisms containing those genes.

> Nonrandom natural selection, *automatically and without awareness or deliberation*, funnels information about environments into the DNA of a species. This coded information *fosters the illusion that organisms were designed* precisely for their environments. Think of the *uncanny resemblance* of camouflaged insects to the background on which they sit. Think of the vertebrate eye with its high-res trichromat retina, variable focus lens, and light-metered fine-adjustment of the pupil (Dawkins, 2006. Emphases are mine).

Thus Dawkins, an Oxford trained Ph.D., can recognize design when he sees it. What he used as the explanation for such design is another matter.

> Above all, the *illusion of design* depends upon the gradual accumulation of small improvements, escalating to levels of complexity and elegance that could not conceivably

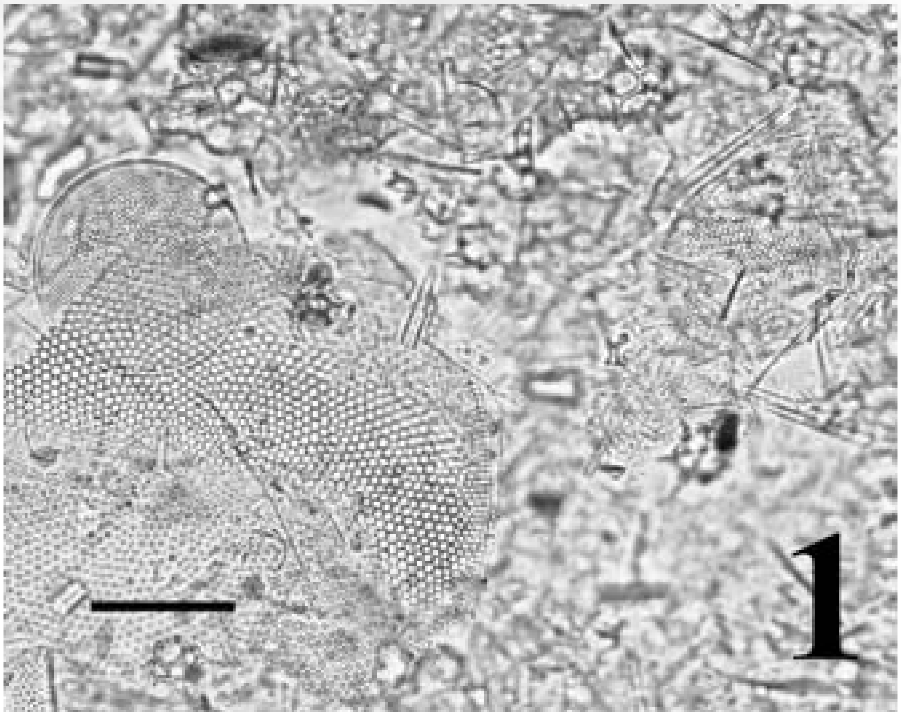

Figure 1. A speck of diatomite from the Lompoc deposit in water on a microscope slide shows the tightly compacted nature of the deposit. Some exquisite patterns are still visible in the glass cell walls of diatoms in this light micrograph. The scale bar, lower left, is 50 micrometers.

> be achieved in a single lucky step. We are rightly incredulous of any suggestion that biological complexity could spring suddenly from primordial simplicity in one generation. But it is easy if each step of a gradual progression is derived from its immediate predecessor which it closely resembles. That, in a phrase, is why evolution can so brilliantly explain life, *where neither chance nor design can* (Dawkins, 2006. Emphases are mine).

Whatever their belief about design and complexity, Dawkins and other evolutionists are inexorably wedded to the pillars of time and of chance as the basis for their explanation of origins.

Diatoms and Design

Microscopic, single-celled plants called *diatoms* are marvels of complexity. They manufacture a miniature Petri-like dish within which they live in their aquatic environments (Armitage, 1992a; 1994; 2004; Armitage and Lumsden, 1995). Like Petri dishes, diatom homes consist of two halves (called frustules) made entirely of glass (silica dioxide or SiO_2). Microscopists have long known of the stunning geometric designs found in these frustules, making them beautiful to look at under the microscope. They come in numerous geometric shapes: squares, circles, ovals, triangles, rectangles, 5- and 6-pointed stars, and others. Not only are there symmetrical, geometric shapes on each frustule, but the frustules are symmetrical to each other in the third dimension (Armitage, 1992a). It has been estimated that diatoms, which cannot be seen by the naked eye, comprise up to 90% of all life in the oceans (Armitage, 1994).

What changing conditions in an aquatic environment would require a diatom to be a square or a star instead of a triangle? Geometric design in these objects (even if made only in a "gradual accumulation of small improvements" as Dawkins puts it), would never have been selected by a natural selection! Even if billions of years of aquatic environmental changes existed, there are no selection pressures that could account for the dramatic beauty of these "jewels of the sea" (Armitage and Lumsden, 1995).

I have an ongoing project examining fossilized diatom remains from Lompoc, California. This Lompoc deposit is a densely compacted bed of diatomaceous earth, also called "diatomite." It is also a fossil graveyard for millions of fish, seals, birds, and whales (Oard, 2004; Snelling, 1995). A speck of this diatomaceous earth only half the size of a letter "s" on this page, manifests a jumbled mass of the glass remains from fossil diatom frustules, many of them shattered (see Figure 1). Although exceedingly small (Figures 2, 3, and 4), these diatom frustules are exquisitely sculptured (see Figures 5, 6, 7, and 8). Figures 2, 3, and 4 afford a perspective of frustule size, in terms of the tiny statue of Lincoln on a penny. When shattered, these tiny glass cell walls yield fragments that can be viewed at ultra-high magnification (Figures 7 and 8). They manifest great regularity and structural detail—both of which are mute tributes to a Master Architect's superior skill.

Identifying individual diatoms from the Lompoc diatomite deposit has been the life's work of such microscopists as Barron, Baldauf, and others (Barron, 1975; 1985, and 1993; Barron and Baldauf, 1986). To date, however, no detailed list of the many thousands of diatom species buried in just this one bed has been produced (McGlaughlin, 1994).

Parasites, Part of God's Complex Plan?

Microscopic parasites, perhaps once beneficial to man before the entrance

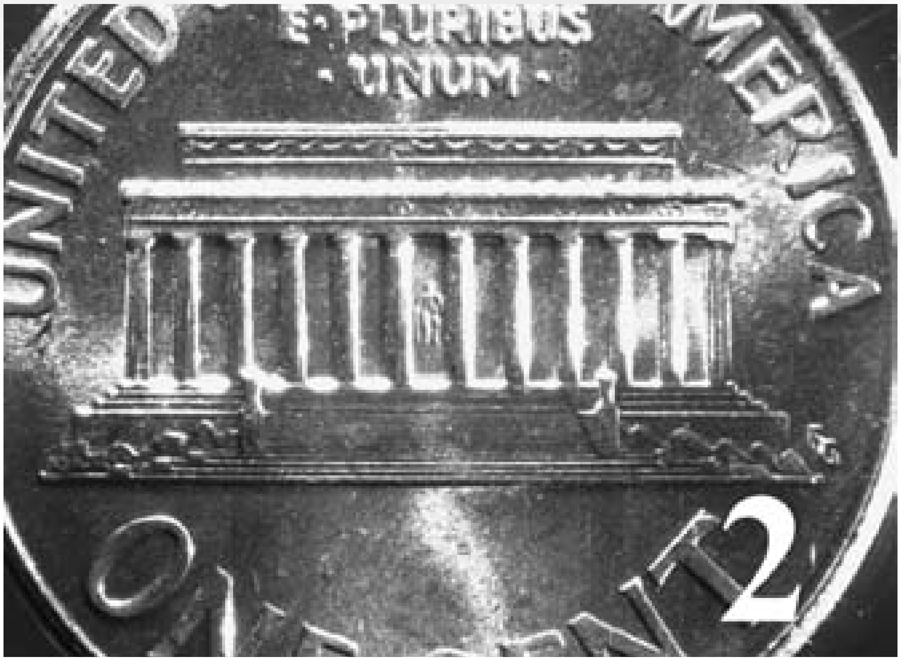

Figure 2. Light micrograph of a United States penny showing the Lincoln Monument. Lincoln's statue can barely be made out in the center of the penny within the monument. This small Lincoln statue will be used as a point of comparison for the exquisite detail evident in diatoms at higher and higher magnifications in Figures 3–8.

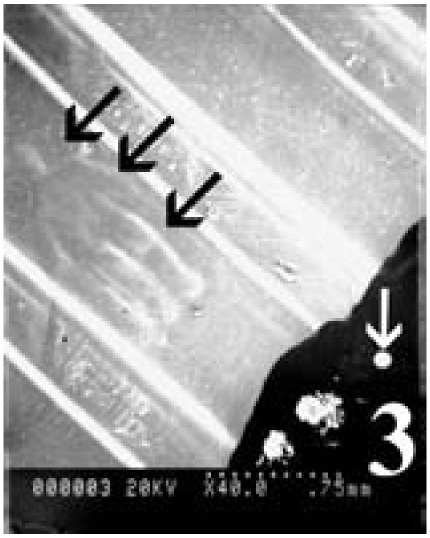

Figure 3. Scanning Electron Microscope (SEM) image of Lincoln's statue on a penny (black arrows). Much smaller than Lincoln's statue on the penny, an individual diatom from the Lompoc deposits is shown at the same magnification (small circle on right—white arrow). Dotted scale bar is 0.75mm

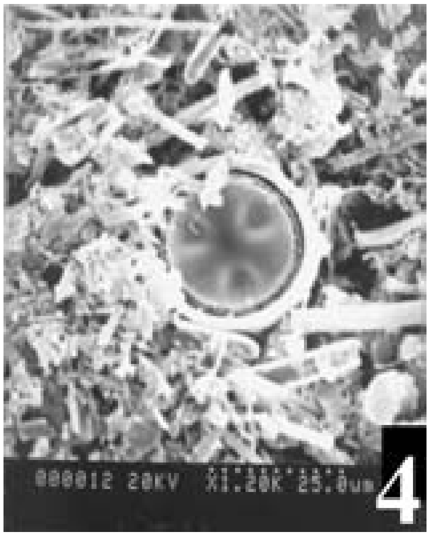

Figure 4. In an SEM image, an individual centric (round) diatom similar to the one seen in Figure 3 is visible here at higher magnification, tightly embedded in the compacted Lompoc diatomite. Dotted scale bar, containing 11 dots is 25 micrometers.

of sin into the world, exhibit exquisite design for the functions that they perform. Fleas and mosquitoes have legendary abilities to track prey by CO_2 sensory systems and can land on them effortlessly (Armitage, 1997). Fleas can go many months without a meal and then jump hundreds of times their body length many times for hours once they find a host (Armitage, 1997). Microscopic worm parasites penetrate their host's skin, seek out blood vessels, and follow them to the specific organ within which they set up shop—all without being detected by the host's immune system (Armitage, 1998; Lumsden and Armitage, 1999). Many parasites requiring several hosts to complete their life cycle are known to alter the behavior of the host that they attack *in order to attract the attention of the very next host in the life cycle*. That next host will then attack and eat the host they are in (Armitage, 2000a). In addition, parasites like tapeworms have outer skins that are an exact replica of the tissues of the intestinal lining of the host they are in. In that way, their outer skin functions as effectively as the intestines of their host to provide them with absorbed nutrients (Armitage, 2000b).

Insects, Too

Microscopes have revealed that scarab beetles and flies literally bristle with chemical sensors, humidity sensors, sensors for temperature, and sensors for wind direction. These sensory systems guide the insects as they fly (Armitage, 1999). In the same way the spray nozzle of the bombardier beetle has been shown to function as a hydrodynamic foil in the efficient and accurate dispersal of a hot, noxious spray used to ward off predators (Armitage, 2003).

Design in Lichens

A lichen is a plantlike entity having a particular fungus that grows in close, symbiotic union with an alga. Lichens produce gelatinous substances, which

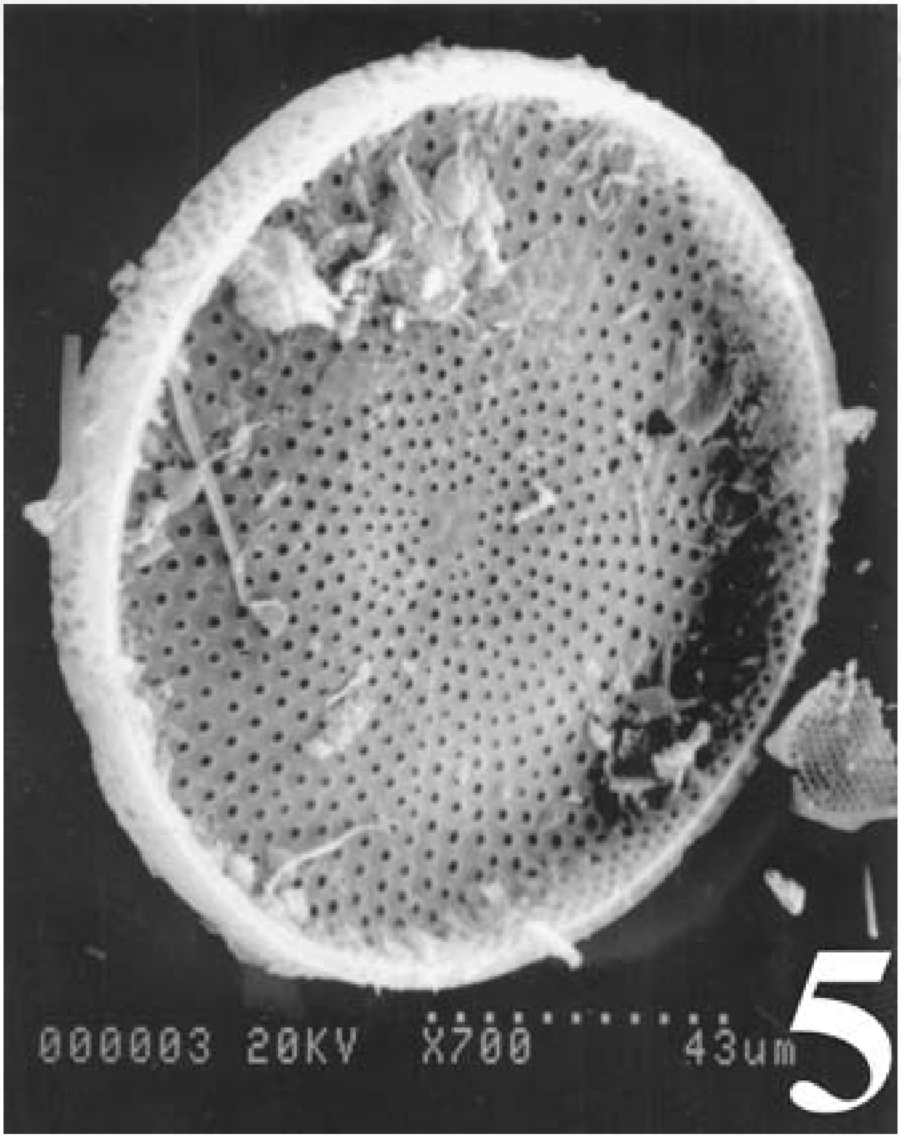

Figure 5. SEM image of an individual centric diatom separated from the tightly compacted Lompoc diatomite and mounted. Note that this circular diatom frustule shows even greater detail than the one seen in Figures 3 and 4. Dotted scale bar is 43 micrometers.

enable them to resist desiccation, thereby equipping them to live in extremely dry habitats (Howe and Armitage, 2002). Lichens also are well endowed to absorb water as soon as it becomes available. Certain dry lichens have been demonstrated to take in 50% of their maximum water content during the first five seconds following addition of water.

The upper portion of a lichen, known as its *cortex*, contains fungi that produce pigments. These cortical pigments help shield the algae located beneath them from excess solar radiation (Howe and Armitage, 2003). Additionally, the algal cells and lichen cells live in such close proximity to each other that the fungus often "invades" the alga with a snorkel-like device called a *haustorium*, by which it gets nutrients from the alga (Armitage and Howe, 2006). Cooperative interactions like these between a lichen alga and its fungus would not be expected to originate by chance.

Bowel Complexity Supports Creation

Even the depths of the mammalian bowel show complex design at the highly magnified level. The intestinal lining of the mammalian bowel is studded with billions of tiny "microvilli" (200 million along each square millimeter of intestine). These are used to complete the digestion of food and absorb metabolites into the bloodstream (Armitage, 2001a). With these and innumerable other examples from the world of the microscope, the evolutionary pillar of random assemblage is reduced to rubble.

New Evidence of Radiohalos Topples the Pillar of Vast Ages

As the new millennium enters its full stride, creationists can look back and rejoice because the sacrosanct pillar of "long ages" also is falling. Evidence supporting a recent creation has been accumulating from many directions. Radiohalos are microscopic spheres of discoloration around little centers of radioactivity in granite rocks. They look like archery targets, and are found in *biotites*, or micas that make up granites. Each unstable radionuclide that is present in the crystalline granite rock emits alpha particles (helium atoms) of unique energy levels. These helium atoms actually damage the crystalline lattice when they come to rest a short distance from the radionuclide, which ejected them, so that discolored halos or rings form. By carefully studying and measuring diameters of the halos, it is possible to determine which radioactive substances were present when the rock was formed.

Surprisingly, halos are found for nuclides that have extremely short "half-lives"! The granites, which are a major component of the earth's crust, had to form suddenly—within only weeks or days—or else halos of these

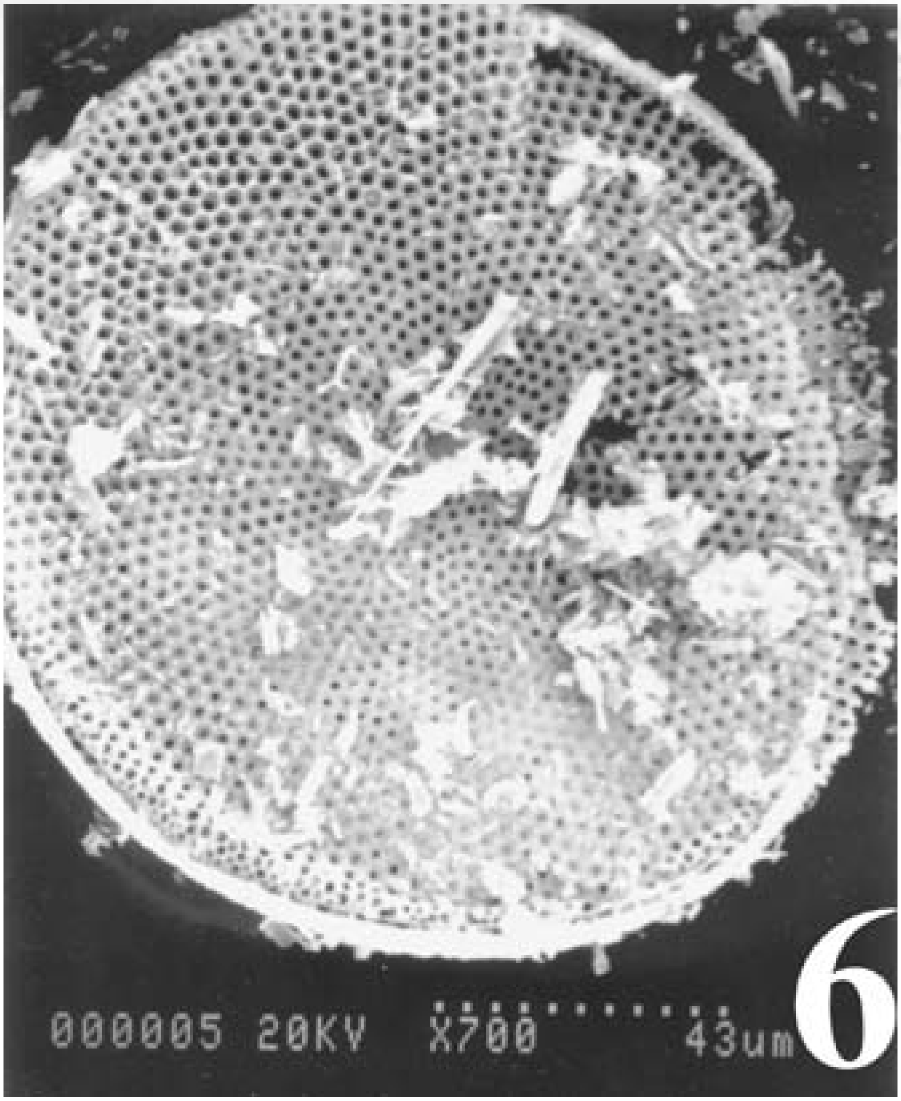

Figure 6. SEM image of an individual centric diatom from Lompoc diatomite. Although part of the frustule (right side) has cracked away, the detail visible in this tiny object is overwhelming! Dotted scale bar is 43 micrometers.

very short-lived radioactive atoms would not have formed. This strong evidence supporting the rapid creation of rocks has been eloquently described and meticulously studied by Robert Gentry (Gentry, 1988; see also Armitage, 1992b, 2001b; Snelling, 2002; Snelling and Armitage, 2003).

Carbon-14 and Radiohalos in Diamonds

Diamonds are thought to have formed by slow cooling over long ages. But radiohalos of short-lived nuclides have been found in diamonds too (Armitage, 1995), indicating that they, too, were formed very rapidly. Recent studies also have shown that some of these crystalline minerals holding halos can be heated up, and the halos are erased (Armitage and Back, 1994). When biotites were heated to as little as 200°C, the radiohalos that had been present were annealed (erased) from the rock, indicating that the rocks must have been relatively cool when they formed.

Carbon-14, which is a radioactive form of carbon having a half-life of only 5730 years, has recently been found in significant quantities within fossil layers once estimated to be millions or even hundreds of millions of years old! The same researchers analyzed several diamonds from diamond mines in Botswana, Namibia, and elsewhere and found them to contain very high amounts of ^{14}C. This is staggering when one realizes that Carbon-14 decays to an undetectable level after 100,000 years (Baumgardner, 2005).

Helium Where It Should Not Be

Zircons are tiny grains within the biotites of granite-like rocks. Minute crystals of zirconium silicate ($ZrSiO_4$) have now been shown to contain massive amounts of helium—a by-product of the radioactive decay of uranium within these zircons (Humphreys et al., 2003; Humphreys et al., 2004; Weiland, 2004). The problem for those who advocate long ages is that helium (a gas) diffuses quite quickly from the zircons. Yet these zircons at depths where temperatures reach 240°C still have massive amounts of helium trapped in them! If the earth were billions or even millions of years old, there would be no helium left in these zircons. The only logical conclusion is that these zircons and the rocks that contain them are quite young.

Creationists can rejoice because the battle is being won. Once again God has chosen the small things (“things that are not”) to nullify the things that are. May all praise, glory, and honor go to God Almighty!

I thank the anonymous reviewers and George Howe who greatly improved on earlier drafts of this manuscript.

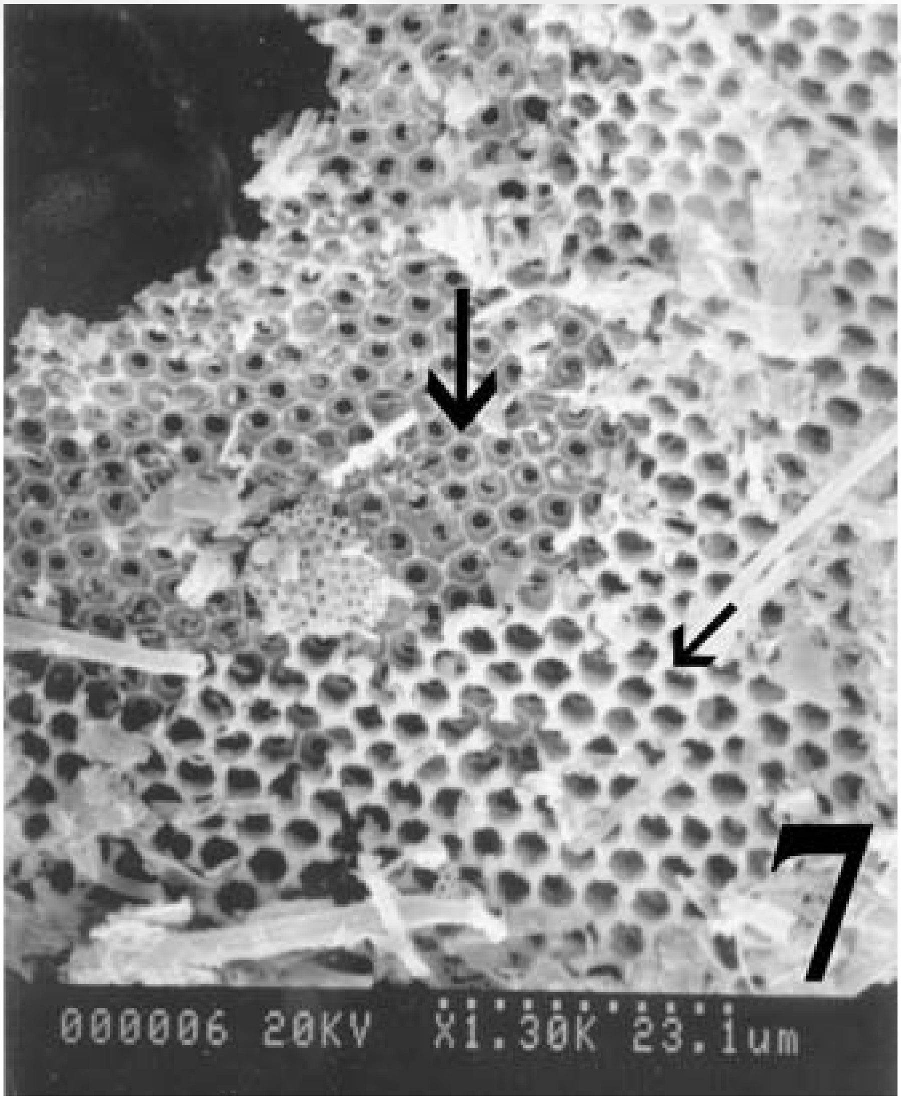

Figure 7. SEM enlargement image of the diatom in Figure 6. Note the upper layer (small black arrow) and the lower layer (large black arrow) of the frustule wall. Such intricacy is a tribute to the divine Designer. Dotted scale bar is 23 micrometers.

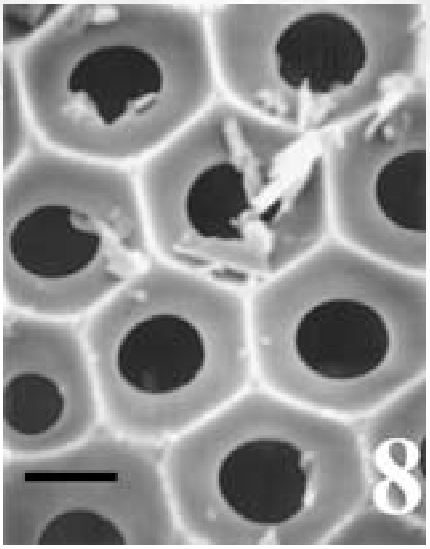

Figure 8. Extreme SEM enlargement image of the area around the large black arrow in Figure 7. Note the intricate, repeating pattern of hexagons and the 2–3 micrometer pores within the diatom frustule wall. This greater complexity of detail seen at higher and higher magnification in a diatom frustule wall crushes the concept of chance as its means of origins. It supports creation by a Creator who possesses limitless skill. Scale bar is 2.3 micrometers, with a magnification of 12,000X.

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NKJV: New King James Version of the Holy Bible. Copyright 1982 by Thomas Nelson, Inc. Nashville, TN. Used by permission. All rights reserved.

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Notes from the Panorama of Science

Buzz Pollination

Introduction

Do you sing while you work? This may seem a trivial question, yet in many cultures singing or humming indicates pleasure. It is akin to the purring of a contented cat or a dog sleeping by the hearth. For eons people have enjoyed bird songs as audible signs of joy, yet evolutionists have attempted to dismiss such melodious notes as merely the sounds of a bird defending its territory or attempting to attract a mate. Numerous scientific studies reveal that another kind of animal sings, or at least hums while it works. Its humming has an unexpected result and presents evolutionists with yet another insurmountable problem.

Buzz Pollination

It seems there is a real buzz (no pun intended) among those who study bees and pollination. Approximately 8 percent of flowering plants have their pollen tightly locked away from most pollinators, yet these plants must rely on pollinators for cross-pollination. For many flowers only a loud sound of a certain frequency will release a shower of pollen upon the one in the right place singing the right note.

Many insects and certain humming birds are attracted to flowers as a source of nectar. Plants produce this sweet, fragrant liquid to attract pollinators. Nectar is largely sugar and is an important source of quick energy for humming birds and a variety of insects. Pollen also is produced by flowers to reward pollination. It is up to 50 percent protein and is a required staple food for endless varieties of adult beetles and bees and an important food for bee larva.

Buzz pollination has been found to be important in the successful cross-pollination of flowers from South Africa (Johnston, 1992) to cranberry bogs of Wisconsin, Minnesota, and the Pacific Northwest (MacKenzie, et al., 1993; Heimstra, 1993). Much of the early work on buzz pollination was described two decades ago (Buchmann, 1983). An enterprising university lecturer in Australia even offers to direct field studies of buzz pollination for graduate students. (Student projects: http://www.anu.edu.au/BoZo/Saul/studentprojects.html)

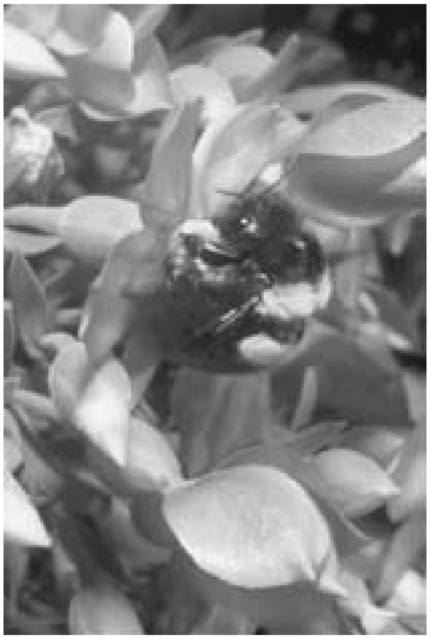

Figure 1. The common yellow banded carpenter bee "buzz pollinating" a flower of sea rose or sticky flower, *Orphium frutescens*. The photo is by Steve Johnson, who sees traditional natural selection as the more tenable explanation for this unique method of pollination.

Certain flowers in the beautiful meadows of Virginia change color to attract buzz pollinators at just the optimal time to collect pollen (Milius, 1999). Pollen release is accomplished by a kind of isometric exercise in which the buzz pollinators clasp the flower with their legs and mandibles (See Figure 1). They use flight muscles to create a loud buzzing sound without noticeable wing movement. The sound releases a cloud of pollen visible to the onlooker. The buzz is distinct in pitch and noticeably louder than the normal buzzing sound associated with bee flight. To some, the sound is a comical, almost rude, sound, akin to one teenager giving another "the raspberry" or "Bronx cheer." Music to one is but noise to another.

For certain species a specific tone or frequency is required to release the pollen. A National Public Radio airing of *Living on Earth* included an interesting piece about the role of native North American bees in the pollination of important food plants. Dr. Sarah Smith Greenleaf, a professor from Princeton University, discussed the importance of buzz pollination in tomatoes. According to her, our native bumblebees or one other native bee are required for proper tomato pollination. European honeybees are ineffective because they do not hum while they work.

Tomato pollen is locked inside the flower and is released only when a sound of middle C (261.63 Hz) is present. Honeybees work in silence and thus no pollen is released. They collect scattered pollen left behind by a recent buzz pollinator. Bumblebees, in contrast, hum at exactly the proper frequency to release the tomato pollen. Dr. Greenleaf demonstrated the process by striking middle C tuning fork and placing it near the tomato flower. A small cloud of yellow pollen suddenly appeared.

Another Nightmare for Evolutionists

At times I truly feel sorry for evolutionists. This is one of those times. Think of the problems they face! It is they who most hold on to dogma by faith. Keep in mind that for any complex structure or behavior to evolve two obstacles must be overcome simultaneously. First, due to the conservative nature of genetic transmission, any "improvement" must occur in small steps. Large, sudden genetic changes are strictly prohibited. Second, each tiny step must be advantageous or it will be quickly and irreversibly eliminated from the gene pool by natural selection. What possible advantage could there by in locking pollen away from pollinators? Conversely, why would a bumblebee or other pollinator expend energy needlessly by buzzing their wings while collecting pollen? Natural selection would indeed eliminate either response. Yet, the opposite occurs, for buzz pollinators abound. Bumblebees buzz at exactly the proper frequency and intensity to unlock the pollen for pollination. How can any rational mind not see design in this? Where there is design there must be a designer. Even Charles Darwin recognized this and is claimed to have said that the thought of the intricacies of the human eye gave him "a cold shudder," for such design demanded a designer. Both aspects of this complex symbiotic relationship must be complete and functioning before any advantage is gained. Indeed, it is the evolutionists who require the greater faith.

Evolutionists argue, after the fact, that buzz pollination is important to avoid self-pollination and to assure the advantage of increased genetic variability that can occur only with cross-pollination. Such a response is neither predictive nor profound. It is like making the rather obvious conclusion that the barn door was left open after seeing the horses running free. It does not ask the more crucial question as to why the barn door was left open in the first place. So it is with creating "excuses" for buzz pollination. If such a specialized and highly orchestrated event is needed to assure cross-pollination, then why do 92 percent of the flowers freely give pollen to all visitors? The evolutionists' statement of the obvious accomplishes nothing in explaining how such a unique, complex example of symbiosis could develop in small steps from random changes in the first place. If evolution is supposed to provide answers to these and other deep biological questions, it fails miserably. Such circular, pointless reasoning abounds in evolution and is necessary only to prop up a failed dogma.

These profound observations demand a Designer, and I know the Designer of flowers and bees. Once again the words of the psalmist come to mind: "The fool says in his heart, 'There is no God'" (Ps. 14:1a NIV). Remember, there is strong evidence of design in nature, and on this we have the Word of God and the facts of science. "Consider how the lilies grow. They do not labor or spin. Yet I tell you, not even Solomon in all his splendor was dressed like one of these" (Luke 12:27 NIV). "You are worthy, our Lord and God, to receive glory and honor and power, for you created all things, and by your will they were created and have their being" (Rev. 4:11 NIV).

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Titan: Saturn’s Mysterious Moon

Titan, the second largest moon in the solar system, has been shrouded in a uniquely dense atmosphere since its discovery. Even the 1980 and 1981 flybys of Voyagers 1 and 2 were disappointing because of the small amount of data returned on the cloaked surface. Until the Cassini-Huygens mission to Saturn, the little that was known about Titan had been determined from Earth-based observations. These observations gave reasonable estimates of its size (2575 km radius), mass (1346 x 10^{20} kg), density (1.88 x 10^3 kg/m^3), orbital parameters (1222 x 10^3 km radius with a period of 383 hr), and high altitude atmospheric composition (82–99% nitrogen, 0–12% argon, 1–6% methane, and traces of hydrogen mixed with other hydrocarbon gases) (Lang 1992). Surface features or lower atmospheric processes were not visible enough to determine their structure due to the dense smoglike atmosphere.

One great mystery that Titan presents to proponents of solar system evolution is how a moon of this size and density retains an atmosphere with a pressure 1.5 times Earth’s after more than 4 billion years, the evolutionary-assumed age of the solar system. Other moons of similar size and composition (Jupiter’s Galilean moons) have no atmospheres. The only other nitrogen-dominated atmosphere in the solar system is that found on Earth. Earth has seven times the gravity of Titan; that helps it retain the gases in its atmosphere.

The new information that the Cassini-Huygens mission has added to the database for Titan is extensive. Cassini, the satellite portion of the mission, which orbits Saturn, is making measurements with instruments that include active and passive radar, a multi-spectral imaging spectrometer, and an ion neutral mass spectrometer during 45 near flybys of Titan, some even passing through its upper atmosphere over the four-year planned mission. The radar maps the surface contours of the moon, while the spectrometers measure the composition of the upper atmosphere and the spectral intensity of radiation entering and exiting from the moon and also take optical quality images of the surface in spectral bands that can penetrate the smoggy atmosphere (see Figure 1).

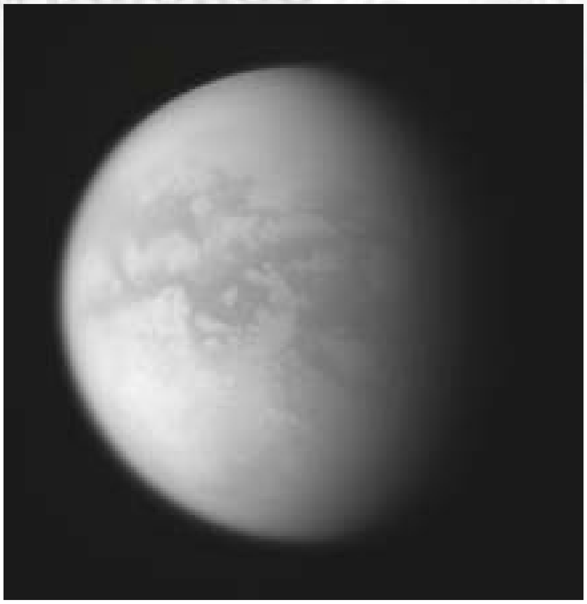

Figure 1. Outbound photo of Titan from Cassini orbiter camera at a distance of 148,000 km. Image scale is 9 km per pixel. Photo courtesy of NASA/JPL/Space Science Institute.

On the first flyby, radar altimeter measurements along a strip 400 km long and 25 km wide revealed a surface at approximately 1625 m altitude above the spherical radius of the moon with variations of ±50 m caused by valleys and hills. The slope of these altitude variations ranges from 3 to 4 degrees. The moon’s surface shows a very low density of meteor craters and has many large, alternating smooth and rough areas. Several dome-shaped areas up to 180 km in diameter were detected by the radar. Some of these included “ice lava” flows and central “calderas.” These data are consistent with a young surface due to a geologically active cryovolcanism process possibly driven by radioactive decay within the moon (Elachi et al., 2005). During another flyby, radar images revealed a shoreline-like feature around a smooth area. The smooth area was 1700 km long by 170 km wide with a network of channels (up to 100 km long) leading to it from the adjacent higher elevation rough areas. The channels indicate that liquid (probably methane) is flowing down from higher elevations, where it likely was deposited by organic compound precipitation (Martinez, 2005).

The mass spectrometer measurements revealed several surprises to atmospheric scientists. The isotopic ratio of nitrogen 14 to 15 shows twice the abundance of N 15 in molecular nitrogen (N_2) when compared to the same ratio in HCN in Titan’s stratosphere as measured from Earth. The isotopic ratio of carbon 12 and 13 in the stratosphere is higher than in any other planetary atmospheres that have been measured, including Earth. But using a diffusion model for Titan’s atmosphere, the scientists predicted a much lower ratio at Titan’s surface than Earth’s. The only isotope of argon (Ar 40) detected was at a 7-parts-per-million level. Other isotopes of argon (Ar 36 and Ar 38) and other noble gases such as krypton and xenon were below the detection threshold of the instrument. The argon 40 is believed to be a by-product of potassium 40 radioactive decay released from beneath the moon’s surface. This small amount of any noble gases indicates that Titan’s atmosphere most likely was not formed from comets delivering these gases to the moon as proposed by the evolutionary model for Earth's atmosphere. The composition of Titan's upper atmosphere was measured at 97 % nitrogen, 2.2 % methane and 0.4 % hydrogen, with the remainder made up of trace amounts (less than 0.1 %) of other organic compound gases (Waite et al., 2005).

The imaging spectrometer with its higher resolution took images of smaller surface features, including a volcano-like dome (<30 km diameter) with a central smooth area on top. The spectrometer imaged an anomalously bright spot on the surface that had been detected recently from Earth. It is brightest in the five-micron spectral band. But this spot is visible in all the spectral bands, and that indicates it is a reflective and not an emissive phenomenon. Because it reflects both infrared and visible radiation, the feature could be fresher ice on top of an otherwise organic residue-covered surface. The spot is elliptical in shape with a 400 km minor axis and 450 km major axis. It has remained the same shape and size over at least the 9 months of Cassini's close-by observations (Barnes et al., 2005).

Besides imaging the surface, the spectrometer has sent back images of clouds in the atmosphere. Enough data have been collected from both this mission and Earth-based observations that atmospheric scientists have modeled the atmosphere so well that they can predict where clouds due to weather patterns will occur (Rannou et al., 2006). In addition to the weather-generated clouds, localized clouds pop up randomly in certain mid-latitude areas. Cassini images show that these small clouds form swiftly and near the surface. They rise rapidly into the troposphere as if they are forced out of a vent in the surface. These clouds are added evidence for cryovolcanism involving methane production below the surface. It is assumed that some process is replacing the more than 6 x 10^{7} kg of methane that Titan loses each day through photochemical processes in its atmosphere (Griffith et al., 2005). Without replenishment of some sort, all the methane in the atmosphere now would disappear in less than 20 million years.

The Huygens probe was designed to enter Titan's atmosphere and take measurements as it descended on a parachute to the surface. The instruments on board duplicate many of the functions of instruments on Cassini. The probe has an atmospheric density and temperature measuring device, a Doppler radar for wind velocity measurements, an imaging spectral radiometer, and a mass spectrometer. Once on the surface it has a package designed to measure the consistency and impedance of the material on which it rests.

During the 2.5-hour descent through the atmosphere, the probe made measurements of atmospheric density and temperature. The temperature ranged from a maximum of -86 degrees centigrade (°C) at 250 km altitude to a minimum of -203 °C at 44 km. The temperature and density data both show a layered atmosphere much like Earth's. These layers provide both an enormous greenhouse effect and an anti-greenhouse effect. Titan's greenhouse effect is a close second in its effect on climate to Venus, even without the abundant water vapor or carbon dioxide of that planet. Its anti-greenhouse effect is unique and balances the temperature at about -180 °C in the lower atmosphere. This effect is about half as strong as the greenhouse effect that by itself would raise the temperature to -169 °C (Mckay, 2005).

Another set of data revealing the layers that make up the atmosphere was received from the Doppler radar wind velocity measurement instrument. Wind velocity peaked at 120 km above the surface at greater than 430 km/hr. The wind is traveling faster than Titan is rotating and in the same direction. Near the surface (below 5 km) the wind is down to 3.5 km/hr or less. The probe also measured rain and haze density in the atmosphere and possibly detected electrical discharges at a distance in one of the layers (Tomasko et al., 2005).

The mass spectrometer measured the composition of the atmosphere during descent. This instrument also was sensitive to the difference of carbon 12 and 13 in the atmospheric methane. Methane makes up 5% by volume of the lower atmosphere and the rest is mainly nitrogen. On Earth, biological processes emit more methane containing carbon 12, so a 10% increase in the isotopic ratio of the two types of carbon is estimated. The isotopic ratio of carbon in Titan's surface methane confirmed the diffusion model prediction of a low carbon 12 content, and therefore the methane is most likely not being produced by living organisms. Methane replenishment probably comes from an as yet unknown process taking place beneath the surface (Naeye and Tytell, 2006).

The Huygens probe began providing visual images of the surface while it was at an altitude of 40 km. These images show dry streambeds, lava-like flows, and flat surface areas at the end of the streambeds, providing supportive data to the radar images from the orbiter. Besides imaging the surface, the probe radiometer measured the spectral characteristics of the materials on the surface and found the materials of the highlands matched the materials in the flat, low-lying areas. This data supports the idea of streams flowing downhill, which carry surface materials along with the liquid methane and dump them in the lower, flat areas. Another spectral measurement the probe made was of the dust in the lower atmosphere. The atmospheric scientists found that the dust reaches all the way down to the surface and is made up of aggregates of hundreds of very small particles, about 50 nanometers in size. This dust probably covers the surface of Titan until it is carried away by the liquid methane from precipitation (Niemann et al., 2005).

The final measurements started after the probe made contact with the surface and continued for 69 minutes until the radio transmission ceased. Only one image was recorded during that time since the camera was hard mounted and not capable of electronically panning. The image shows a flat surface extending to the visible horizon (see Figure 2). From Cassini orbiter images of the area near where the probe landed, the probe most likely is located in a streambed. The surface at the landing site is covered by rounded stone-like objects, as if they were carried to their locations by flowing liquid. The composition of the stones is most likely ice that is as hard as granite at the surface temperature. But the spectral analysis of light reflected from the stones does not support this conclusion. This may be due to the surface of the stones being covered with other material or a large amount of an as yet unknown material embedded in the ice.

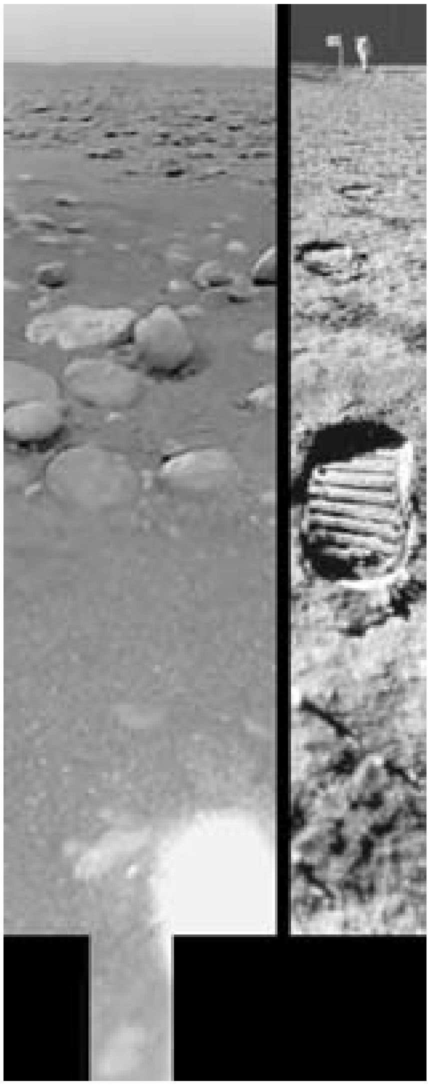

Figure 2. Surface view from Huygens probe setting on Titan's surface juxtaposed with a similarly scaled picture taken on the Moon's surface. Photo courtesy of ESA/NASA/JPL/University of Arizona.

Another measurement made on the surface was the spectral analysis of dust raised into the atmosphere during the landing. It determined that the dust is made up of many hydrocarbon compounds. An impedance probe established that the surface is not made of water ice as expected. Titan, due to its mass and density, has to be made up of 50% water, and most of that water should have risen toward the surface as it froze. The mass spectrometer measurements of the surface material determined that instead of water it contains liquid methane, which is also supported with the measurement of the surface consistency as loose, wet sand (Zarnecki et al., 2005).

Several mysteries have been solved by the data returned from the Cassini-Huygens mission to Titan. Significantly, methane replenishment, if it occurs, is most likely a geological process and not because of living organisms. But new mysteries also have been uncovered. The goal of solving the mystery of how Titan evolved seems to have become more difficult to achieve. Evidence obtained does not favor the formation of the atmosphere by accretion of comets because of the low levels of argon and other noble gases.

The latest evolution theory is that Titan accreted asteroids made up of a mixture of ammonia and water ice rich in methane. The ammonia/water ice formed large deposits of clathrate hydrate on top of an ocean of ammonia/water when the moon's upper layers cooled to their present temperature. The current working hypothesis is that releasing of methane to the atmosphere has occurred in three phases lasting up to a billion years each. It is currently in its third, and presumably last, phase. Nuclear decay taking place in the core is assumed to be the major source that heats the ammonia/water ocean and the clathrate hydrate so that the latter outgases its methane. Mission scientists predict that by the end of the latest warming episode in 500 million years, the stored methane will be used up and the moon will lose its atmosphere permanently after another 100 million years (Tobie et al., 2006).

The scenario for a creation model is much less complicated. God created the moon within the last 10,000 years with all the elements and molecules that have been detected being part of the original design. There would not have been enough outgassing to make much difference in the amount of methane the moon now retains due to the short time since its creation.

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Letters to the Editor

Overlooking a Gem

Baker Books has recently published *Darwin Strikes Back*, the sequel to Thomas E. Woodward's verbose history of the intelligent design (ID) movement, *Doubts about Darwin*, which was a repackaging of his doctoral dissertation in the rhetoric of science. I found the present work to be an accurate and readable account of the key figures, events, and books of the ID movement and its adversaries, with particular emphasis on the period since 1997. But while some degree of distancing from his creationist cousins is to be expected in a book from this perspective, Woodward missteps in stating (p. 22), in reference to *The Mystery of Life's Origin* by Thaxton, Bradley, and Olsen (1984), that "'Mystery' was in sharp contrast with anything in the genre of scientific creationism." He is forgetting ideas such as Dr. Swee Eng (S.E.) Aw's *Chemical Evolution: An Examination of Current Ideas*. This gem from the creationist literature was originally published in 1976 in Singapore and later by Master Books (San Diego, CA) in 1982. It covers ground similar to that covered in *Mystery*, e.g., the primitive earth, life's building blocks in the laboratory, the origin of the genetic code, enzymes and proteins, philosophical factors, etc., and with a depth that made *Mystery* seem like a children's primer.

Dr. Aw, a biochemist and chemical pathologist, was co-publishing research papers in scientific and medical journals like *Endocrinology* as late as (to my knowledge) 2004. His book was included in *Reviews of Thirty-one Creationist Books* (Weinberg, 1984), which in turn was favorably reviewed by Tim M. Berra (date unknown), whose capsule summary of the assessment of *Chemical Evolution* favorably notes the reviewer's comment that "by page 165 [the author] resorts to redbaiting." This is because in a brief section near the end of the book titled *The Philosophy of the Search for the Origin of Life*, Aw mentions Oparin's use of dialectical materialism and J. D. Bernal's reference to the ideas of Engels and Marx in their published work. Berra, of course, is infamous for "Berra's Blunder," the notion that the descent with modification of Corvettes was "overwhelmingly obvious" to reasonable people, when the vehicles actually demonstrate design by intelligent engineers. Shall we collectively dub Berra's false analogy and straw-man fallacies "Berra's errors"?

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Questions from CRSEF

We were surprised to see the two articles in the September 2006 *Quarterly* by Hugh Miller et al. Hugh Miller was a longtime member of our group, Creation Research, Science Education Foundation (CRSEF), until a few years ago. He is no longer part of our Board of Directors. As stated in the "Acknowledgements" section (p. 92), CRSEF funded a good part of the work reported in these articles. This letter has two objectives. First, CRSEF wishes to distance ourselves from the poor science and apparent association that Miller et al. has to us. Second, we hope that criticism like this will eventually lead to improvement of the quality of articles that appear in the *Quarterly*. It appeared to us that the articles may have been printed without any editing or careful consideration of the contents at all. We realize thAT Miller et al. may have corrections and responses to all of our remarks below, but why weren't these issues caught in the review process? Please note the following:

1. The title of the first article refers to ^{14}C dating of amber in Wyoming. Only one date from Wyoming amber is presented (>46,450). The reader is given no indication of any analytical information that accompanies such dates when received from the ^{14}C lab. In ^{14}C dating, typically ">" refers to the fact that very little ^{14}C was detected, and if present, was probably beyond the scope of the instrument detecting it. It is significant to note that all of the reported ^{14}C dates of ancient amber are listed as ">." Furthermore, the major cited work (Kosmowska-Ceranowicz et al., 2001) is in an obscure foreign journal, so it is nearly impossible to check the data's credibility. Based upon what is presented, it is impossible for the reader to decide if the single Wyoming date is credible or not. We were able to obtain a copy of the Kosmowska-Ceranowicz et al. (2001) paper from Hugh Miller. The second (and final) sentence of the abstract states: "Radiocarbon analysis of the [Wyoming] sample, as well as of two samples of succinite, placed all of them *beyond the range of ^{14}C dating* (emphasis added)." Hugh Miller was the third author of this paper. What is published in the *Quarterly* is inexcusable.

2. The title of the first article refers to "global catastrophism." In the authors' argument for global catastrophism and rapid deposition of amber on page 89, they quote Gary Gordon from an unavailable home video. Thus, the reader can make no conclusions about the validity of the remarks. The authors claim Gary Gordon used to work for ICR. Who is Gary Gordon? He is not a geologist, and he has never written anything for ICR (at least nothing shows up on the ICR web site). Furthermore, the remarks they cite Gordon making seem rather incredible and are completely unsubstantiated in the text of the article. The authors are falsely using the credibility of ICR to make their point seem more reasonable. Instead, the authors should have cited actual sedimentological data to make their point.

3. Versions of Figure 1 have shown up in at least two other publications. A quick internet search reveals a similar figure: http://www.geo.uw.edu.pl/JEWELLER/13PJ/11burszt.pdf. However, there is no source given for the figure and no information given as to where the figure or the data in the figure was obtained. As one reads the article, one wonders what the point of the figure is because it is not adequately explained in the text. Has this figure been plagiarized from another source, or is this better explained in the Kosmowska-Ceranowicz et al. (2001) paper? The reader hasn't a clue. In fact, an identical figure appears in Kosmowska-Ceranowicz et al. (2001).

4. It appears from the text on page 88 that two samples were mixed together to obtain a ^{14}C date. Is this really true? Here are the authors' own words: "However, because of the small size of the Wyoming amber the conventional lab analysis could not date it. Instead, they took samples from the museum in Warsaw and RC dated them *with* (emphasis added) Wyoming amber at an Accelerated Mass Spectrometer (AMS) lab, and wrote an excellent article, which is available from Hugh Miller." There are techniques for sample mixing and analysis, but if this was done, it was not explained in the text of the *Quarterly* article. *In fact, the article has no "methods" section at all to show what techniques were used.*

5. Reading on in the same passage in the text on page 88, the authors themselves admit that the Wyoming date might be questionable: "This proved to be a difficult analysis…" The whole paper is based on the premise of this single, questionable (> 46,450) date!

6. The authors give no positive evidence for the fine laminations in Wyoming being deposited catastrophically, even though they may have been so. They simply cite a laundry list of references to catastrophic geology (p. 88) and believe this makes their case! Apparently the authors believe that fine laminations are always produced catastrophically, which is certainly not the case. If the authors had kept abreast of the creationist work currently being done on the Hanson Ranch, they would have been aware of the groundbreaking work that is being done there and which would help confirm their conclusions (Chadwick et al., 2002; Chadwick et al., 2005; Spencer et al., 2001).

7. Why is there a history lesson of the dubious human-like handprint and human-like footprints of the Paluxy River in this article? What does it have to do with the subject of the article? Also, how is the extended discussion of Einstein and the development of quantum theory found on pages 84–85 relevant to this paper?

This work is certainly not comparable to that of Einstein.

8. How do the authors arrive at the conclusion of "Creation age, years" in the last column of Table I? No justification is given for their "conversions."

9. On page 91 the authors' state: "We attribute the lack of collagen and soft tissue in dinosaur bones to the hot environment of the western United States." What does this mean? What rationale do they have for making this statement? The authors are well aware that dinosaur bones collected in Alaska lack collagen (Whitmore, 2005). In fact, Hugh Miller was part of the research team that was unable to confirm organic remains in these bones. Why they say "hot" environments lack collagen and "cool" environments are more likely to have it is puzzling when they know the negative results from the Alaskan material and the apparently positive results from the *T-rex* bones from the hot summer environment of Montana.

10. On page 92 the authors claim the triceratops bones were buried in a "salt-water solution" yet they give no physical evidence to support their claims.

11. On page 86, the authors claim that Alaskan dinosaur bone samples were radiocarbon dated. They give Fields et al. (1990) as a reference. Yet, this reference contains no Alaska dinosaur bone radiocarbon dates.

12. The features on page 97 in which the authors are so interested simply appear to be concretions. If so, they were never transported during the Flood as the authors seem to claim; they probably grew in place after deposition of the sediments. This should have easily been recognized in the review process. The inability of Miller et al. to recognize these features in the field calls into question the amount of geologic training they have had and the geological conclusions they make in these papers.

13. On page 90, authors claim the broken and angular nature of the amber is because of "rapid hydraulic deposition." Yet, it appears the broken, jagged pieces of amber can easily be explained by the authors' own admission that the amber particles contained "macro-cracks" and had "numerous fractures" (p. 91). This seems to be a more reasonable interpretation of the "jagged" amber than a "rapid hydraulic" catastrophe.

14. On page 90, the authors state that "Thus, if carbon compounds had a tendency to pick up modern CO_2 from the air or from organic chemical absorption, the high carbon content of amber would likely make it the best candidate for such absorption. But, there was no indication of such contamination based on the results of ^{14}C dating of amber. Challenges by Stafford (1992) for relatively young dinosaur bone ^{14}C ages therefore seem to be inappropriate arguments for anomalous RC ages for Cretaceous/Jurassic dinosaurs." One amber specimen is far too small a sample to draw such a sweeping conclusion from; even with the addition of the two European specimens, an insufficient number of samples have been studied to conclude that amber cannot be contaminated by modern radiocarbon. Furthermore, in light of the great chemical differences between amber and bone, the assumption that if amber is not naturally contaminated by young ^{14}C, then dinosaur bones will not be contaminated either is very debatable. While we do not necessarily disagree that anomalous ^{14}C in supposedly ancient objects is a real phenomenon with important geochronological implications, Miller et al. have not proven their point in this paper.

15. On page 96 the authors state that Buddy Davis is part of Answers in Genesis; perhaps to give the article more credibility? The picture was taken in 1996, probably before Mr. Davis was part of AiG. Whether Mr. Davis was part of AiG or not at this time doesn't matter. The authors are "name dropping" to give the article undue credibility.

16. Why is there a photo essay of a trip that happened over 10 years ago? Aren't there better things with which to fill the pages of the *Quarterly*, especially since manuscripts are being published nearly a year after acceptance?

17. A significant part of the work presented by Hugh Miller et al. in these articles (the ^{14}C dating and the trip to Wyoming to collect amber) was paid for by the Creation Research Science Education Foundation (CRSEF) of Columbus, OH. The authors do give brief acknowledgement to CRSEF in the "Acknowledgements" *but no member of CRSEF ever was aware that Hugh Miller et al. wrote this article, or that the article was "in press." None of us ever had the chance to review it. This would only seem appropriate since a significant portion of the funds were supplied by us.* After reading it, we can see why the authors may have been leery to get our input. Perhaps this is what we are most disturbed about.

We can go on, but we think this is enough to make our point: We are all young-earth creationists, firm believers in the Flood, and some of us are long-time members of the CRS. We believe the Flood was responsible for the Wyoming deposit being studied. However, we are interested in seeing the quality of the *Quarterly* greatly improved. If the quality is going to be improved, articles like this need to be promptly rejected. Only quality research should ever be considered for review and/or publication. If this doesn't happen, the anti-creationists are going to continue to have a heyday with articles like this, and rightfully so.

This letter was approved by unanimous action of the CRSEF Board of Directors. All board members voted, except for one (who is not listed).

Sincerely,
John H. Whitmore, PhD
President, CRSEF
Associate Professor of Geology,
Cedarville University

Aaron Hutchison, PhD candidate
President elect, CRSEF
Assistant Professor of Chemistry,
Cedarville University

Robert Garbe
Board of Directors, CRSEF

Joseph Guthrie, MS
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Paul McDorman, BA, BS, MEd
Board of Directors, CRSEF

Ann Payne
Board of Directors, CRSEF

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Response to CRSEF

In this, my general response to Dr. Whitmore's remarks, I would make several observations as follows:

(a) The editor of that section, Dr. Eugene Chaffin, when he saw our original paper regarding the paper from Poland entitled, "Cederite from Wyoming: Infrared and Radiocarbon Data," thought it a good idea to present such data for amber as this was new information.

(b) Both reviewers of the submitted paper also thought it a good idea, although one did not care to see the Paluxy fossil footprint discoveries discussed in the introduction as that subject was "too controversial." The other reviewer thought it OK in the introduction if the data were well documented with references.

(c) In order to meet their requirements I then went into greater detail in the introduction by bringing *CRSQ* readership up to date on C-14 dating research performed by CRSEF, the Paleo Group, geologist Don Patton, and books by research engineer, Robert Helfinstine (1993), who were independent researchers, and by Carl Baugh and Dr. Wilson, archaeologist of Australia (1987) who had made much of the fossil footprint discoveries in 1982 and beyond. The paper was accepted.

(d) I also was an independent researcher in the 1980s and worked with geochronologist John DeVilbiss with CRSEF's board approval and so reported on the discoveries by CRSEF's own members of that period who participated in excavations.

(e) The editors Dr. Chaffin and Dr. Kevin Anderson and the two peer reviewers were very helpful in guiding us in finessing this, our first peer-reviewed paper in *CRSQ*. Earlier a letter was published by *CRSQ* (Miller, 2005) entitled, "More Failures for Long-age Potassium Argon Dating." Among the changes recommended by the editors were: (1) a change in the title itself, which was to insert the word "Pioneering" (by one of the reviewers) to describe these first dates ever for C-14 dating "true amber"; (2) a more precise wording of portions in the contamination section; (3) the fact that not all laminations are deposited catastrophically; (4) request for evidence of saltwater inundation in WY, and, of course, (5) there were issues in the reference section, including reference challenges, recommendations for addition of several pertinent references, including an earlier paper on the geology of the Hanson ranch (Holyrode et al., 1996) for which I was unaware. Since the geology of the area had already been explained in this article, there was nothing more I could add but for the specific strata where we performed our amber collection studies. Of course there were the usual grammar corrections for which editors are rightly famous. I enjoyed and appreciated very much working with the editors, knowing full well that they themselves had undergone some recent personnel changes and were under the gun on deadlines. I thought I had made all the suggested changes during a time period when my family was undergoing many health problems. I simply do not know what happened as I recall making the corrections.

(f) The foresight of the editors however in accepting the paper has been rewarded. Here are quotes from several important persons who have read it and e-mailed us. [1] A key member of the Intelligent Design Group, a Ph.D. in chemistry wrote: "Yes, Hugh, I saw the article in *CRSQ*. There's a lot of good stuff there." I had sent him an article he had not seen that attacked ID; I also asked him if he had seen the *CRSQ* article. [2] In an unsolicited e-mail a physicist of a foreign country who is an AMS dating specialist and had read it on *CRSQ*'s web site commented: "Just wanted to encourage you to carry on the work. It is important. You can contact me if you want further info, clarifications, or want a referee for a paper etc.—I may also be able to point some good labs for further datings. I have amber from Russia and plan on dating it." This person also suggested that I report pMC's if available. So I have done so below for the three amber specimens—part of authors' learning curve on the importance of pMC's. I had neglected to do so and do apologize. [3] From a famous research scientist, with 50 or more peer-reviewed articles and who managed a university laboratory in Belgium, now retired to France, and who is also an expert on all radiometric dating, one with whom I've worked for many years through the mails. She asked that I attach the paper to my next e-mail. After reading the paper she responded: "I read your paper on amber etc. Excellent" [4] After receiving the "obscure foreign journal" (as Whitmore called it) in 2001, I gave copies of the article to CRSEF board members and mailed a copy to ICR's John Morris who responded with a thank-you letter, as I remember. Since amber contains 79 to 88 percent carbon, perhaps this was impetus for Baumgardner and ICR to RC date diamonds and coal. But of course why should anyone in their right mind C-14 date diamonds, which are thought to come from the bowels of the earth and have given even lower pMC's than amber? Perhaps the ICC should not have allowed Baumgardner's paper at the 2003 ICC conference since such data is well beyond the reasonable detection system of even modern-day AMS equipment, which is another objection by Whitmore. From 1983 on, CRSEF researchers, including myself, have worked hard to raise funds for the main projects dealing with the Paluxy fossil ichnites, radiocarbon dating of fossils, the small adventure to the Hanson Ranch, and the major one to Alaska. I myself have raised much of those funds through newsletters and person-to-person contact; and was the main impetus in writing and publishing the results of our research in 1990 and 1992 as Devilbiss had done for the ICC conference in 1986 as well as much of the funding for CRSEF's now defunct C-14 lab. Paleo will continue the research, as we have promised our sponsors and coworkers who agreed with our research direction. Paleo has a network of fossil hunters and we C-14 date at only licensed laboratories. Both I and Paleo have served CRSEF for many years, as noted above, including raising much of the research funds for both the scintillation counter and coordinating the projects only to see: (1) all our research on the fossil ichnite project photos and reports wiped off the CRSEF Internet site without even telling the board members, let alone taking a vote; (2) the board turn down a request to calibrate the CRSEF scintillation counter equipment by C-14 dating several homogeneous fossil specimens at a licensed lab; (3) the shutting down of the lab without notice; and (4) Whitmore's refusal to even answer an e-mail request last fall to return all the bone fragments of the Acrocanthosaurus dinosaur that belongs to our friends at the Creation Evidences Museum. I had loaned Whitmore these bones in good faith when he asked for them and his disregard for simple propriety has thwarted a joint research project of said bones. Thus, neither I nor the Paleo Group are beholding to CRSEF.

(g) Methods for preparing amber samples for C-14 dating are taken from the report as sent to Dr. Gieretych. Both I and, I assume, Whitmore have the actual reports for both the amber and the Alaskan dinosaur bone C-14 dates.

Amber, WY, and two Baltic specimens [samples KIA2961, KIA1962, KIA2963]. "Dear Dr Giertych, 97/10/31: The three amberlike samples you sent us have now been measured. The two amber samples you supplied were inspected for surface contamination under the microscope. We picked and cleaned a nice piece of amber from the third sediment sample. Possible carbonate contamination was removed by treatment with 1% HCl at 60°C overnight. The samples were then washed with demineralized water till pH>5.5 and dried. About 10 mg of each sample was combusted in a quartz ampulle with CuO and silverwool at 900°C. Based on the observed CO_2 pressure we calculate carbon contents from 82% to 88%. The CO_2 was reduced with H_2 over about 2 mg of Fe powder as catalyst, and the resulting carbon/iron mixture was pressed into a pellet in the target holder**.**"

Dinosaur Bone Fragments [grouond fossil material in report] AK 297-V-84 (KIA5523) "Dear Prof. Dr. Giertych, Kiel 01.10.1998. Please find enclosed the results of the AMS ^{14}C dating of your sample. The sediment sample was checked under the microscope. The sediment contained various sizes of "amberlike" particles. Part of the sediment without the larger particles (3627.1 mg) was taken for dating. This material was extracted with 1% HCl, 1% NaOH and again 1% HCl at 60°C. Humic acids were precipitated from the NaOH extract with HCl, washed, and dated separately. The combustion to CO_2 was performed in a closed quartz tube together with CuO and silver wool at 900°C. The CO_2 was reduced to graphite with H_2 at 600°C over 2 mg of an iron catalyst. For the AMS measurement the iron/carbon mixture was pressed as a pellet into a target holder." [Comment: The lab thought they were dating the sediment matrix for WY amber.]

(h) The Paleo Group has an obligation and responsibility to its supporters to report on and publish all research data when the opportunity presents itself. This also appears to be the policy of the other scientists in cutting-edge scientific research as noted by the following quote, "*Stephen Meyer who supports ID research asked whether science was ever advanced if the minority position always remained quiet. In fact, he challenged that one of the best ways for science to protect itself from "bad" ideas is not censorship but full disclosure and argumentation*" (Anderson, 2006, p. 66). All quality research organizations perform that duty to the best of their ability. However, I do think these discussions with the current CRSEF board through Whitmore will eventually bring progress (Why, we would never disagree!!!) and hope he has learned as much from Paleo as we have from him.

Again as I suggested in our paper if anyone wishes a copy of the paper "Cedarite from Wyoming: Infrared and Radiocarbon Data," from Poland, contact the corresponding author of the *CRSQ* paper and we will be happy to forward by USPS or by e-mail attachment which is now scanned and in my computer files. I urge that *CRSQ* readers compare the results of C-14 dating amber with the results of dating gas wells, coal, and diamonds (Doughty, 2006; Baumgardner, 2003). Perhaps some of you will carry on the baton of C-14 dating of fossils. In the Polish paper you will find Introduction, Materials and Methods, Results and Discussion sections, all that is needed for a full evaluation. Some of

PMC values and C-14 dates for the three amber specimens

KIA (a)	corrected FMC	conventional age	13c
1. Saxony 2961	>0.0008 +/-0.0007	>49,210 BP	-22.11 +/- 0.23%
2. Sambia 2962	-0.00036 +/-0.0006	>51,900 BP	-21.88 +/- 0.10%
3. Wyoming 2963	>0.0015 +/-46,500	>46,450 BP	24.06 +/-0.33%

(a) (Ceranowisz et al., 2001)

Whitmore's suggestions and criticisms were helpful; we also thank him for bringing the Chadwick/Spensor papers to our attention.

A point-by-point detailed response to Prof. Whitmore's remarks for paper entitled "Pioneering C-14 Dating of Wyoming Amber and its Implications for a Young Earth and Global Catastrophism"

(1) Perhaps Whitmore did not see the word "Pioneering" in the title. Also the "obscure foreign journal" is published in both English and Polish by the Warsaw Museum of the Earth in conjunction with the Polish Academy of Sciences. Furthermore: (a) This museum has cataloged over 2000 articles on amber (1534-1993) entitled Bursztyn Baltycki (b) Dr. Maciej Giertych, a world-famous geneticist is a coauthor of the paper on C-14 dating of amber. (c) The lead author, Dr. Ceranowicz, heads up the amber section of the Museum of the Earth, and she herself excavated the Baltic amber specimens that were AMS C-14 dated separately from the Wyoming amber. Perhaps the ICC should have disallowed Dr. Baumgardner's C-14 dating of coal and diamond (Baumgardner, 2003) paper because the pMC values and RC ages were > (equal to or greater than). *Perhaps what is inexcusable are many of Whitmore's remarks.*

(2) Gary Gordon represented himself, correctly, as one who formerly worked with ICR in some capacity (a professor at Christian Heritage College in the 80s as just learned from talking with the ICR office). I had sent the 2001 amber paper to Dr. John Morris in 2001 and received a thank-you reply as he always seemed to appreciate our association whenever I sent him our RC dating reports or papers, so I didn't give it a second thought since we were all on the same wavelength even though neither he nor we could speak absolutely. However, I cannot help but wonder that when ICR saw the AMS C-14 dates for amber perhaps it was an impetus for "pioneering" dating of diamond as well. You really don't know what influence publishing all your data might have on future research. After all, with amber containing over 80% carbon with trace amounts of C-14, perhaps diamond might also. It did but even less than amber! Of course the above may be a sin of presumption on my part, but it is a possibility as the paper was sent in 2001 to ICR.

(3) The source for Figure 1 was clearly printed at the bottom of Figure 1. Perhaps Whitmore missed it. There were several other figures (Ceranowicz et al. 2001); but, I only reported the Figure with the Cederite-amber comparison as noted in the right column of page 87 (Miller et al., 2006): "Also as was found out later in Poland the Triceratops site amber contained succinites based on infrared absorption spectra (Figure 1)." Please note that the members of the team that collected amber from Wyoming included Paul McDorman, a member of the current CRSEF board, and coauthor Matt M. Miller, one of my sons who has participated in excavations (1983, 1988, 1989 along the Paluxy River, TX, and the Hanson Ranch, WY). Even the samples in Figure 1 are carefully labeled IRS 369, IRS 474, and IRS 508 and there are photos in the photo essay.

(4) I probably should have used the phrase "C-14 dated separately" in the text. However separate C-14 dates were provided in Table I and Figure 1, as it never occurred to me that anyone would think otherwise. Yes there were no methods provided for C-14 dating of the amber in our paper for which I will take responsibility. However, such omissions are common practice by C-14 specialists (Stafford, 1999), so I don't know if I was in error or not. The amber paper did have all the methods and is available to everyone as it was to Whitmore et al.

(5) The paper was based on AMS C-14 dating three "true ambers" containing succinic acid, two Baltic ambers, and one from Wyoming. What's the problem? This was a "pioneering study." Indeed this was a difficult analysis as Dr. Giertych wrote. Why? First of all Dr. Giertych had to convince himself, then a specialist from a museum of natural history, and then a major C-14 dating laboratory to C-14 date amber fossils they know from evolutionary assumptions to be tens of millions of years old. Most folks might consider this a major achievement, but it is ignored by Whitmore et al. Why? Has he challenged ICR's C-14 dating research on coal and diamond? Why didn't Whitmore attack *CRSQ* for printing the next article in the same issue (Doughty, 2006)? Both the dates for amber and a carbonized fossil imbedded in Paluxy limestone rock gave similar corrected pMC values and ages of around 50,000 RC years BP. As Doughty (2006) wrote in his conclusions, "Thus, the maximum conventional age for the area of the Fruitland Formation where the sampled wells are located is 49,770 years" (p. 109). I think this is fascinating data and showed excellent judgment by the editors to have placed both articles in the same *CRSQ* issue (*CRSQ*, Vol. 43, 2006). Had Dr. Giertych, ICR, or Paleo succumbed to the intimidation tactics found in Stafford (1992), we long ago would have given up on C-14 research on fossils.

(6) One of the peer reviewers pointed out that some laminations are produced non- catastrophically, so I used the word "can," then argued from paleohydraulics that rapid deposition could have happened on the Hanson Ranch. Is it wrong in science to argue one's point from a different perspective than others? Before submitting the paper I had visited SW UN's web site looking for technical papers but found nothing but a long list of excavated dinosaur bones. When I checked Chadwick's name on my search engine, I could only find Chadwick and Spencer's paper abstracts. Thank you for the references.

I do hope that Chadwick et al. will search for C-14 datable organics including collagen and collagen compounds like hydroxyproline and C-14 them as Paleo is doing at least with collagen.

(7) See (a), (b) (c) above and reread the introduction, "Why date amber?" and "Radiocarbon Dating of Fossils." Coauthor, J.R. Michaels is a research atmospheric physicist who has developed an interest in amber and anomalous C-14 dates for fossils vs. the ages claimed by evolutionists, so he introduced the comparison. I fault myself for not providing the reference for the classic book (Kuhn, 1973) which J.R. provided and upon which the astronomy stories of anomalies are based. For this letter J.R. wrote: "The nature of science expects anomalies to always exist, since our knowledge of the universe will never be perfect; as science advances, new anomalies appear, that do not fit into current theories. Great anomalies (such as significant C-14 content in dinosaur remains, or detectable C-14 in diamonds) that shake the foundations of current theories point to a necessary scientific revolution as the resolution to the remarkable and unexpected observations. Each revolution in science should bring us closer to the truth, since more observations are encompassed by each succeeding theory. This is how science is done."

(8) I referenced Robert Brown's C-14 article (1992) on correcting C-14 ages in the text on page 92 but failed to explain. In addition I neglected to provide a footnote in Table 1. I was always taught during my many years of research that a table must stand on its own; that's what footnotes are for—Mea Maxima Culpa—a senior moment on the author's part.

(9) The rationale is NOT simple. There WAS organic matter in the Alaskan bones discovered based on the Kjeldahl nitrogen extraction system [Yes, I was helping to run the experiments with Doug Wilder et al. The results indicated the presence of carbon datable organics]. AMS C-14 equipment would have been ideal for such testing even for extracting collagen. Several of us proposed and Whitmore personally selected a dinosaur bone sample from Alaska, and the sample was sent to the same licensed lab that had C-14 dated the amber specimens. Therefore, Whitmore must have seen the C-14 dating report. A member of the team studying these bones off and on for over a year told me there was at least one sample that he remembers that contained 1% N; that would be indicative for the presence of collagen (Stafford, 1989). Perhaps Whitmore, like all of us in 1997, didn't understand the pretreatment procedures and their interpretations by different labs and the minute amounts of organics and/or collagen needed for AMS dating. But the lab did report C-14 dates for the alkaline and humic acid fractions (KIA-07/10/1998) which no one reported until the amber paper. The organic carbon content of the bone selected by Whitmore [AK 297-V-84] contained 0.18 % by wt. carbon and the dates for the alkaline fraction was 31,050 +230/-220 [6.9 mg] and that for the humic acid 36480 +560/-350 years BP [18.8 mg]. Our AMS learning curve was in its infancy, so we did not realize the younger date was for the bone itself and the older date from more mobile older carbon. Thus the "The Great Alaskan Adventure" (Whitmore et al., 1997) was partially successful but never followed up because admittedly no one really understood: (a) intricacies of how different labs report their data and (b) the importance of AMS dating of mg size samples which could have included collagen had we asked for that determination. The project protocol called for extracting collagen-related select purified compounds like hydroxyproline (Stafford, 1989) for dating, but finding just collagen would have been very helpful. Anyhow, more field and lab research is now justified.

Only the bone hydroxyapatite of dinosaur bones were C-14 dated before 1992 as the labs told us there were no collagen-based compounds in the Western dinosaur bones we reported (Fields et al., 1990; Garbe et al., 1992). Thus the bones from TX to CO to WY were not pretreated and may have contained either younger or older "more mobile carbon." So although these anomalous dates challenged the evolution community (Stafford, 1992) and other skeptics, they were dismissed and then apparently ignored or ridiculed. In 2006 a lab working with Paleo extracted and C-14 dated bone collagen from two different dinosaur femur bones in excellent condition. They were supplied by Otis Kline, one of the "pioneers" of the Hanson Ranch station and now museum director of a museum in Glendive, Montana and the F.A.C.T Research Station in the MT Badlands. These bones were in the same C-14 range as the Acrocanthosaurus from TX and the AK dinosaur bone. Even the total organics after the acid, base, acid pretreatment to remove contaminants gave ~the same date as the collagen. Again a pioneering effort and we will report whatever we find after the second round of dating at a different lab.

(10) I recall being asked by an editor about the evidence for that statement, and I'm sure that I did correct this by eliminating the word "salt" but obviously something went wrong. Score another (-) for senior moments.

(11) Whitmore is correct; the Fields paper (1990) did not contain a C-14 date for Alaskan dinosaur bones. The references should have been written (Fields, 1990 and Lab report for AK 297-V-84, 1997). Based on what a lab technician at a licensed lab wrote me, the alkaline fraction would be for the dinosaur bone itself. The humic acid fraction was "more mobile older carbon" that had infiltrated the bone. Again, more research is needed.

(12) Since I am indeed not a geologist, I keep a *Penguin Dictionary of Geology* handy. **Concretion:** *a nodule*

without a concentric structure. **Hoodoo**: *a pillar of rock or weakly consolidated sediment formed by differential erosion in arid to semi-arid regions*. To me the feature better resembles a hoodoo due to the "differential erosion" of the rock underneath the rounded darker one. Thus I called it Hoodoo-like. In my many years in electroplating research I observed that "nodule formation" occurred on very high current density areas of flat cathodes where the deposition rate is extremely high; nodules are usually rounded but not necessarily so. I'll let the geologists looking at this geo combo in Figure 4 vote or give an expert ruling on it based on their experience and other reports. But to me it could have been sediments moving at a high rate of speed and then suddenly stopping and solidifying in place over another layer similar to what is seen by the lab and field research scientists I referenced. When in hydraulic motion, sediments move both vertically and sideways as they separate based on particle size and density, as perhaps do the fossils themselves. One really can't claim an absolute age of the fossils by their position in the geologic column any more than a certain fossil can provide an absolute age of a given strata by its position in the geologic column. The Paluxy fossil footprints are a case in point as these prints appear on all visible strata, at least on the McFall ranch, and seem to have lithified very rapidly within hours not thousands of years, otherwise there would be no prints, no raindrop ichnites. So why couldn't these geological features pictured in Figure 4 lithified in hours during a quiet period between transgression and regression?

(13) It seems logical to me that the stress fractures are both a cause and effect of existing macrocracks in amber, which then separate one fragment from another during possible rapid hydraulic motion like in tumbling barrels with which I'm familiar. Since I wasn't there when all this happened, I really can't be sure. However, when examining the tiny pieces they are all slightly rounded, indicating some continued to tumble after separation.

We failed to mention that last observation in the text. I'm grateful to Whitmore for bringing up this point.

(14) See (a), (b), (c) above. It was never our intention to prove every point, only to point out anomalies that continue to accumulate against the "fairy tale" of macroevolution. Indeed an alternate purpose of this paper was to give all the data we had so as to encourage others to RC date fossils of all types, including amber (see Miller et al., 2006, p. 86, last paragraph, first column). Speaking of Stafford, he has been a coauthor of some 30 papers. In one the authors made sweeping conclusions based on only three samples, two human and one sloth ~10,000 RC years (Mena et al., 2003); the other did not mention methods for C-14 dating of 40 samples (Schild et al., 1999). On the other hand Stafford as lead author went to great length to explain AMS methods (Stafford et al., 1999; and Stafford, 1990).

(15) Buddy Davis has been a part of the Paluxy fossil human footprint research longer than Whitmore. Davis participated in both Dr. John DeVilbiss's and my 1988 excavations and was CRSEF's molding/casting manager before joining AIG. I tried to give everyone credit where credit was due. I also was instrumental in getting another AIG researcher to participate in the 2004 McFall Paluxy River excavations but for fear of being called a name-dropper I will not mention the individual.

(16) I don't know why you are using me to pick on the editors of *CRSQ*. But let me ask you, why did it take you over 10 years to report on what you claim to be no scientific discoveries from CRSEF's Alaska Adventure (Whitmore, 2005)? In actuality it took Paleo only five years to report on the C-14 dating of amber and only three years after I resigned from CRSEF, and we had gathered many more useful C-14 ages for fossils from "licensed labs" during the past three years. We also wanted to supplement a previous group of photos (Holroyd, 1996) with photos of amber etc. which were never mentioned regarding proposed research; and to ensure that most of the "pioneer" organizers and participants of the 1995–1996 Hanson Ranch excavations received due credit for establishing the Hanson Ranch research station, which has thus far been denied them.

(17) See (a) through (h).

Sincerely,
Hugh R. Miller
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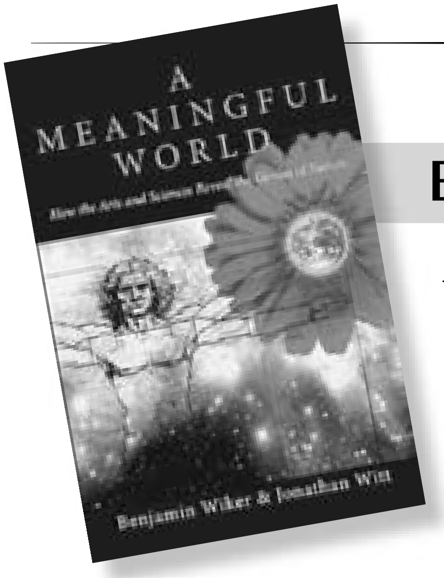

Book Review

A Meaningful World: How the Arts and Sciences Reveal the Genius of Nature

by Benjamin Wiker & Jonathan Witt

InterVarsity Press, Downers Grove, IL, 2006, 257 pages, $18.00.

The title tells it all. At a time when there is a popular emphasis upon meaninglessness and despair, this book arrives with its searchlight projecting rays illuminating antidotes to these widespread wanton assumptions. Indeed the universe is very meaningful. "…during the last several decades, evidence has been accumulating that the universe is finely tuned not only for our existence, but also to allow us to discover the genius of the universe, including the discovery that it is seemingly designed for discovery" (p. 148).

A Meaningful World covers a broad spectrum of topics including astronomy, chemistry, mathematics, physics, the chemical nature of life, and the evolution of life forms. Authors Wiker and Witt believe that the universe is the product of an ancient "big bang," but they strongly are opposed to any grand scale evolution, namely Darwinism. "The universe was supremely fine-tuned and fit for biology…Why…suffer any longer under the reign of materialism and its subspecies, Darwinism?" (p. 238).

This thought-provoking book has footnoted references and a six-page Index.

Wayne Frair
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Creation Research Society

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3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.
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